



ConnectPort[®] X2e ZB

User's Guide

ConnectPort X2e ZB Ethernet

ConnectPort X2e ZB Wi-Fi

ConnectPort X2e ZB Cellular

©Digi International Inc. 2013. All Rights Reserved.

The Digi logo, ConnectPort, iDigi Device Cloud, iDigi Manager Pro, iDigi Dia, and XBee are trademarks or registered trademarks of Digi International, Inc.

All other trademarks mentioned in this document are the property of their respective owners.

Information in this document is subject to change without notice and does not represent a commitment on the part of Digi International.

Digi provides this document “as is,” without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of fitness or merchantability for a particular purpose. Digi may make improvements and/or changes in this manual or in the product(s) and/or the program(s) described in this manual at any time.

This product could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes may be incorporated in new editions of the publication.

Contents

| | |
|---|-----------|
| Contents | 3 |
| Chapter 1: Introduction | 6 |
| About this guide | 6 |
| Digi contact information | 6 |
| ConnectPort X2e ZB | 7 |
| Hardware interfaces..... | 8 |
| Configuration and management interfaces..... | 8 |
| Web interface..... | 9 |
| iDigi Manager Pro™ interface | 10 |
| Programming interfaces and capabilities | 12 |
| Python development independent of the target device | 12 |
| Python development on the target device..... | 12 |
| Digi ESP for Python | 12 |
| Linux command shell | 13 |
| Product differences from predecessor ConnectPort X products | 13 |
| Where to find more information..... | 14 |
| Chapter 2: Hardware | 15 |
| Hardware specifications | 17 |
| ConnectPort X2e ZB Ethernet and Wi-Fi..... | 17 |
| ConnectPort X2e ZB Cellular..... | 19 |
| LEDs..... | 21 |
| Power LED | 22 |
| XBee LED | 22 |
| Signal strength LED | 23 |
| Network LED..... | 24 |
| Button | 25 |
| Factory reset..... | 26 |
| Enable configuration changes via the device discovery tools | 26 |
| Enable the device web interface | 26 |
| Enable a special-purpose Wi-Fi configuration mode | 26 |
| Antennas..... | 27 |
| Regulatory information and certifications..... | 28 |
| RF exposure statement..... | 28 |
| FCC certifications and regulatory information (USA only) | 28 |
| European Community - CE Mark Declaration of Conformity (DoC)..... | 29 |

| | |
|--|-----------|
| Industry Canada (IC) certifications | 30 |
| Safety statements | 31 |
| International EMC (Electromagnetic Emissions/Immunity/Safety) standards..... | 33 |
| Chapter 3: Configuration..... | 34 |
| Configuration can be performed programmatically | 34 |
| Important configurable settings..... | 35 |
| Ethernet IP network settings..... | 35 |
| Wi-Fi settings..... | 36 |
| Mobile settings and provisioning..... | 37 |
| NTP time server settings..... | 38 |
| iDigi remote device management | 39 |
| Additional device configuration settings..... | 40 |
| Python | 40 |
| XBee settings | 40 |
| SureLink™ settings | 40 |
| Configuration from the Web interface | 41 |
| Open the web interface | 41 |
| The Home page..... | 44 |
| Configuration settings pages..... | 46 |
| Configuration from iDigi Manager Pro..... | 56 |
| Basic configuration settings..... | 57 |
| Advanced configuration settings | 57 |
| XBee Networks page | 60 |
| XBee RF module settings | 61 |
| SMS settings | 62 |
| Chapter 4: Administration/maintenance..... | 64 |
| Common administrative tasks | 64 |
| Firmware updates..... | 64 |
| File management..... | 65 |
| Reboot device | 65 |
| Administration from the Web interface | 66 |
| Firmware Update | 66 |
| XBee Firmware Update | 66 |
| XBee Status | 66 |
| Mobile Status | 67 |
| File Management | 74 |
| System Log | 75 |
| Reboot..... | 76 |
| Administration from iDigi Manager Pro | 77 |

| | |
|---|-----------|
| Restore Factory Defaults | 78 |
| Reboot..... | 78 |
| Disconnect | 78 |
| Firmware..... | 78 |
| File Management | 79 |
| System log | 80 |
| System information..... | 81 |
| Chapter 5: Programming..... | 82 |
| Programming resources..... | 83 |
| Python | 83 |
| Digi ESP for Python | 83 |
| Programming calls through Server Command Interface (SCI) and Remote Command Interface (RCI) | 85 |
| Digi Developer Community Wiki | 85 |
| ConnectPort X2e ZB Wiki..... | 85 |
| Digi Python Programmer's Guide | 86 |
| Python Support Forum on digi.com..... | 86 |
| Digi-specific Python modules for programming..... | 87 |
| Sample programs..... | 88 |
| Button handling | 88 |
| LED control | 89 |
| Watchdog..... | 90 |
| RCI callback | 91 |
| XBee functions | 93 |
| Sending and receiving SMS messages | 93 |
| The ConnectPort X2e ZB filesystem | 94 |
| Differences between Windows and Linux filesystems..... | 94 |
| Important directories..... | 94 |
| Access/browse the filesystem from device interfaces | 94 |
| Common operations for directories and files..... | 94 |
| The Linux command shell (command-line interface) | 95 |
| Username and password for the Linux command shell..... | 95 |
| Connect and log on to the device..... | 95 |
| Command shell reference documentation | 95 |

Introduction

CHAPTER 1

About this guide

This guide introduces the hardware, firmware, and software features of the ConnectPort® X2e ZB. It describes how to perform configuration and administrative tasks, and how to develop and run applications on the device. Programming focuses on basic programming concepts and teaching through examples. More detailed programming content and program examples are provided in the Digi ESP™ for Python development environment. It also includes hardware specifications, certifications, and regulatory information. This guide is intended for a developer/programmer.

Digi contact information

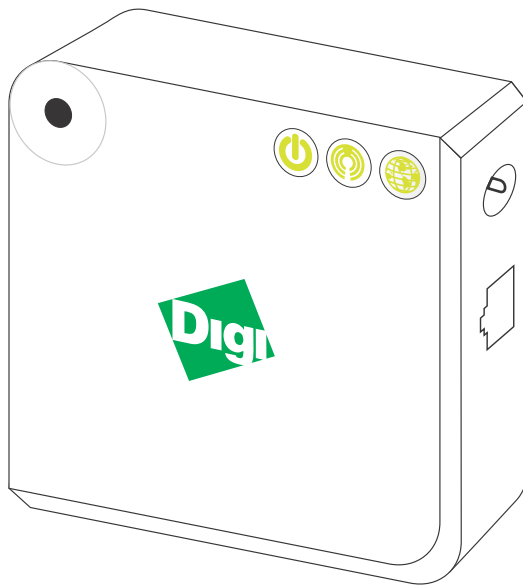
For more information about Digi products, or for customer service and technical support, contact Digi International.

| To Contact Digi International by: | Use: |
|-----------------------------------|---|
| Mail | Digi International 11001 Bren Road East Minnetonka, MN 55343 U.S.A. |
| World Wide Web: | http://www.digi.com/support/ |
| email | Look for the link Contact Digi Support at this address: http://www.digi.com/support/ |
| Telephone (U.S.) | (952) 912-3444 or (877) 912-3444 |
| Telephone (other locations) | +1 (952) 912-3444 or (877) 912-3444 |

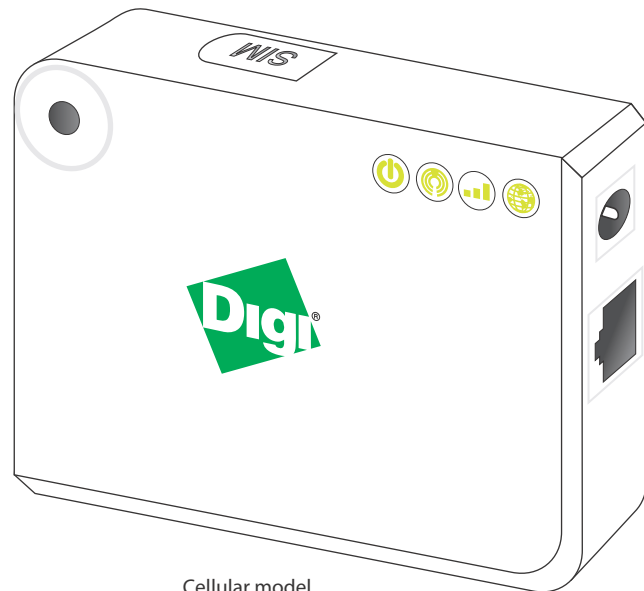
ConnectPort X2e ZB

The ConnectPort X2e ZB is a compact, ZigBee®-to-IP gateway that provides low-cost IP connectivity of RF devices and sensor networks. Featuring an easy development environment, the ConnectPort X2e enables custom applications to run on the device, with access to XBee® or ZigBee wireless networks through an XBee RF interface, while providing WAN connectivity to cloud-based applications through Ethernet, Wi-Fi, or cellular interfaces.

The ConnectPort X2e ZB features an end-to-end development environment, Digi ESP™ for Python, that allows for rapid M2M-specific application development on the industry standard Python scripting engine. The Digi ESP for Python environment is an IDE featuring device detection, debugging, compiling, and downloading of code to Digi gateways.



Ethernet and Wi-Fi models



Cellular model

Hardware interfaces

ConnectPort X2e ZB hardware interfaces include a button for controlling various device operations, LEDs that indicate device state and status of connections, link and activity for Ethernet, Wi-Fi, cellular, and XBee network connections. Some of these hardware features can be controlled through programming. Hardware interfaces are covered in "Hardware" on page 15.

Configuration and management interfaces

To establish network connectivity with a ConnectPort X2e ZB device, minimal configuration is required in many environments. This means that you may not need to set or change configuration settings from their factory defaults to begin developing with the device. As necessary, there are several user interfaces for interacting with the ConnectPort X2e, for example, to view or change configuration settings or perform important administrative tasks such as updating firmware or rebooting the device.

- A web-based interface for configuring, monitoring, and administering Digi devices.
- iDigi Manager Pro, a remote-management interface.

Web interface

The web interface, available via a local network connection to the ConnectPort X2e ZB, provides an easy way to configure device settings and perform administrative tasks. Device Information displayed varies by model. Here is the Home page for a ConnectPort X2e Cellular model. Note that the model name varies according to the Cellular model (UMTS, EVDO Verizon, EVDO Sprint, etc).



Device Configuration and Management

Home

Configuration

[Ethernet Network](#)
[Mobile Connectivity](#)
[SureLink](#)
[Python](#)
[Network Services](#)
[Time](#)
[iDigi Connectivity](#)
[XBee Network](#)

Administration

[File Management](#)
[Firmware Update](#)
[XBee Firmware Update](#)
[XBee Status](#)
[Mobile Status](#)
[System Log](#)
[Reboot](#)

Device Information

Current System Parameters

| | |
|-----------------------|---|
| Model: | ConnectPort X2e ZB UMTS |
| Firmware Version: | 3.1.0.1 cpx2e-3g release gw-3.1.0.1 03/28/2013 11:44:19 CDT |
| Device ID: | 00000000-00000000-00409dff-ff5c196f |
| Date and Time: | Mon Apr 1 18:11:16 UTC 2013 |
| Ethernet MAC Address: | 00:40:9d:5c:19:6f |
| Ethernet IP Address: | 10.10.19.119 |
| DNS Servers: | 209.183.33.23,209.183.35.23,8.8.8.8 |

Network Connectivity Status



- ☒ Network interface detected.
- ☒ Connected to local network.
- ☒ IP address assigned.
- ☒ Prepared to contact iDigi server.
- ☒ Contacted iDigi server.
- ☒ Ready for iDigi communication.

Refresh

iDigi Manager Pro™ interface

The default behavior of ConnectPort X2e ZB is to power up and connect to the iDigi® Device Cloud™. iDigi Manager Pro is a software-as-a-service, delivering capabilities that empower IT, network operations and customer support organizations to conquer the challenges of managing the vast array of equipment in their device networks. As a network grows, the complexity of effectively managing the network assets grows exponentially. Hosted on the iDigi Device Cloud, iDigi Manager Pro directly tackles and conquers the universal problems of a dynamic device network:

- Centralized control over large numbers of devices
- Reducing service complexity
- Maintaining high levels of security
- Provisioning and decommissioning of equipment
- Adding functionality to device networks

A feature of all Digi gateways, routers, device and components, iDigi Manager Pro provides a robust suite of network management tools with centralized control via the iDigi Manager Pro service module.

The screenshot displays the iDigi Manager Pro web interface. At the top, there is a navigation bar with the iDigi logo and links for WELCOME, IDIGI MANAGER PRO (active), DATA SERVICES, SECURITY, ADMIN, and HELP & API EXPLORER. Below this is a secondary navigation bar with tabs for Devices, XBee Networks, Alarms, Operations, Schedules, and Carrier. The main content area shows a table of devices with columns for MAC Address, Device ID, IP Address, Device Type, Description, and Firmware Level. A sidebar on the left shows a tree view with 'Root' and 'Groups...'. At the bottom, there is a map of the United States with a blue circle indicating a location in the Midwest.

| MAC Address | Device ID | IP Address | Device Type | Description | Firmware Level |
|--------------|-------------------|-----------------|---------------------------------|-----------------------------------|----------------|
| 00409D552A02 | 00409DFF-FF552A02 | 192.168.250.4 | Wireless Vehicle Bus Adapter | | 3.1.1.0 |
| 00409D3B6B52 | 00409DFF-FF3B6B52 | 10.9.92.104 | ConnectPort X4 NEMA | Modbus test for XBee DigiMesh 2.4 | 2.13.0.4 |
| 00409D6877C4 | 00409DFF-FF6877C4 | 184.243.238.250 | ConnectPort X2e ZB EVDO Sprint | | 3.1.0.1 |
| 00409D552A03 | 00409DFF-FF552A03 | 192.168.250.20 | ConnectPort X2e ZB | | 3.1.1.0 |
| 00409D552A34 | 00409DFF-FF552A34 | 192.168.250.10 | ConnectPort X2e ZB Wi-Fi | | 3.1.1.0 |
| 00409D5211A3 | 00409DFF-FF5211A3 | 10.52.18.99 | ConnectPort X2e ZB Wi-Fi | | 3.0.10.1 |
| 00409D687764 | 00409DFF-FF687764 | 80.187.238.205 | ConnectPort X2e ZB UMTS | | 3.0.8.7 |
| 00409D6877BC | 00409DFF-FF6877BC | 75.238.149.74 | ConnectPort X2e ZB EVDO Verizon | | 3.1.0.1 |
| 00409D552A1F | 00409DFF-FF552A1F | 192.168.250.36 | ConnectPort X2e SE Wi-Fi | | 3.1.1.0 |
| 00409D552A01 | 00409DFF-FF552A01 | 192.168.250.16 | ConnectPort X2e SE | | 3.1.1.0 |

From the iDigi Manager Pro interface, you can configure devices, remotely update device firmware, upload and manage Python/iDigi Dia files, remotely reboot devices, reset devices to factory defaults, backup/restore device configuration properties, import or export the device configuration properties, track devices, monitor devices and connections.

With iDigi Manager Pro, management of large populations of devices is made easy. Devices can be tagged and grouped together enabling management tasks to groups of devices within a network simultaneously. Furthermore, the Scheduled Operations feature allows device management tasks to be automated and scheduled to run either on a one-time or a recurring basis, against a single device or multiple devices. The Alarms capability of iDigi Manager Pro facilitates monitoring the health of a device network. For instance, should a device disconnect or stay connected for longer than a specified period, an alarm fires and notification of the alarm can be sent via email in real-time.

In addition, the iDigi Web Services provide seamless integration from Digi gateways into customer back office applications. These iDigi Web Services are accessed on the **Help and API Explorer** tab of the iDigi interface.

Some things to note about using iDigi Manager Pro:

- Devices must be registered on iDigi Manager Pro before they can be accessed via the iDigi platform.
- To minimize network traffic, iDigi Manager Pro uses caching. As a result, device settings can be out-of-sync between the device and the settings viewed on the iDigi Manager Pro console.
- Device information can be refreshed on demand when the device is connected, and is refreshed automatically when a device connects.

For more information on iDigi Manager Pro as a remote device network management solution, see these resources:

- *iDigi User's Guide*
- *iDigi Web Services Programming Guide*
- iDigi tutorials and other documents available on www.iDigi.com

Programming interfaces and capabilities

.....

The ConnectPort X2e ZB allows custom embedded logic via the Python scripting language. To meet the needs of customers with varying levels of Python expertise and application complexity, a number of development strategies are supported, which can be mixed and matched as a developer sees fit:

Python development independent of the target device

The ConnectPort X2e ZB features a standard Python 2.7 distribution, allowing applications that are not dependent on Digi-proprietary interface modules to be developed and tested independently of the device. Scripts developed in this manner can generally be transferred to the device for final testing at the end of the development cycle, with a PC serving as a device proxy during the bulk of development.

Python development on the target device

The ConnectPort X2e ZB features a Linux shell interface allowing a developer to experiment with the Python interpreter interactively, create scripts, launch scripts, and control their operation.

Digi ESP for Python

The ConnectPort X2e ZB is supported by the Digi ESP for Python, an IDE featuring device detection, debugging, compiling and downloading of iDigi Dia/Python code to Digi gateways. Integrated into the Digi ESP are example applications that can demonstrate the use of some of Digi's proprietary Python extensions, serving as templates for applications seeking to incorporate common functionality.

iDigi Dia

The ConnectPort X2e ZB is supported by the iDigi Dia application framework, which is provided within Digi ESP for Python. The iDigi Device Integration Application ("Dia") is an application software platform for Digi gateways. iDigi Dia makes connecting remote devices and sensors to Digi gateway products easy by providing a ready-to-use software. Put simply, the iDigi Dia framework is used to gather data from XBee sensor networks, transform the data into a useful form, and push the data to the iDigi Device Cloud for consumption by a user. iDigi Dia is written in the Python programming language, and can be extended to meet unique device connectivity requirements. Particularly valuable in conjunction with the Digi ESP for Python, the iDigi Dia framework seeks to shrink the development cycle for complex data gathering and transformation applications. With abstractions for components like interface handling (drivers), data management (channels), data delivery (presentations); and a library of ready-to-use modules for common operations; the iDigi Dia framework allows a developer to focus efforts on proprietary logic, not the glue that holds an application together. The iDigi Dia application framework also provides the shortest path to integration on proprietary logic with Digi's network device and data management platform, iDigi.

Linux command shell

Note: The ConnectPort X2e ZB also has a Linux shell command-line interface. While Digi ESP for Python is intended as the main programming interface, this interface may be used for some programming and device management tasks. This interface is accessed with a username of **python** and password **dbps**, and is described in "The Linux command shell (command-line interface)" on page 95.

Product differences from predecessor ConnectPort X products

ConnectPort X2e ZB gateways differ from predecessor ConnectPort X products. These differences are of importance to programmers and integrators who are familiar with the predecessor devices and need to develop applications and install or manage the gateway. This list of differences assumes that the reader has knowledge of the features and functions of predecessor ConnectPort X products.

- **Operating system:** The ConnectPort X2e ZB is built on the industry-standard Linux operating system, versus a Digi-proprietary embedded operating system.
- **Memory:** The ConnectPort X2e ZB has 64MB of RAM and 128MB of Flash memory. Users have access to up to 20MB of RAM and up to 20MB of Flash memory. Predecessor devices had less RAM and Flash available for custom Python applications.
- **System date and time:** The ConnectPort X2e ZB, for reasons of improved security, has a greater dependence on time synchronization than predecessor products. In so doing, the ConnectPort X2e ZB expects to use the standard Network Time Protocol (NTP), requiring connectivity with an external NTP time server. Without a proper sense of time, the device will be unable to correctly validate security certificates, disabling the ability to connect to iDigi, as well as disabling the ability to update the firmware.
- **Button:** The ConnectPort X2e ZB features a programmable button. The button can be configured to activate some Digi native features (such as returning a device to its factory defaults), and can also be used by custom applications. For more information on the button see page 25. This button behavior differs from the Reset button behavior on the ConnectPort X2.
- **LED behaviors and meanings:** The ConnectPort X2e ZB has some differences in LED behavior and meaning from predecessor ConnectPort X products. See page 21 for descriptions and page 89 for programming example.

- **User interfaces:**
 - The ConnectPort X2e ZB has a web user interface for both network configuration and access to the log file for troubleshooting the initial connection to iDigi. For more information on the web interface, see "Configuration" on page 34.
 - Command-line interface differences: The ConnectPort X2e ZB allows access to the Linux shell using SSH. This shell and common operations are described on page 95. Access to the gateway is at the user level; the user is named **python** and the password is **dbps**. Access to a command-line interface through Telnet is not supported for network security reasons. Commands in the command-line interface for predecessor ConnectPort X products are not supported. However, some ConnectPort X2 command-line interface commands have equivalents in the Remote Command Interface (RCI).
- **Firmware updates:** Due to the complexity of the Linux-based system, standard firmware updates cannot be used to downgrade a system.
- **Logging:** The ConnectPort X2e ZB supports continuous logging for troubleshooting. The log files can be browsed from the web interface or pulled from the device filesystem in the iDigi interface. They are stored in the Linux filesystem in the /WEB/logging directory and persist across reboots and power cycles.
- **Supported Python version:** The ConnectPort X2e ZB uses Python interpreter version 2.7. Many predecessor ConnectPort X products use Python 2.4. Any custom-compiled Python code must be recompiled for Python interpreter 2.7. Custom Python modules are not 100% compatible with the ConnectPort X2e ZB. Therefore, porting may be required in addition to recompiling.

Where to find more information

In addition to this guide, find additional product and feature information in the these documents. These documents are available from Digi's Support page <http://www.digi.com/support/> unless otherwise noted.

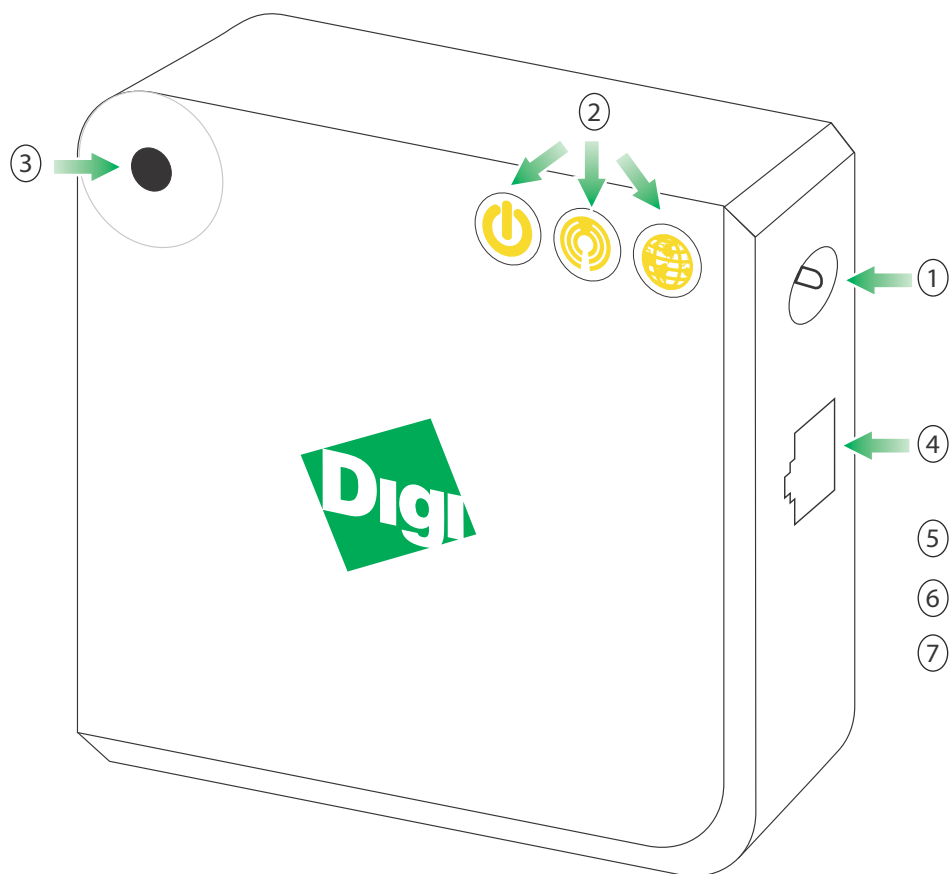
- *ConnectPort® X2e ZB Getting Started Guide*
- *XBee/XBee-PRO ZB SMT RF Modules Product Manual* (90000976), for more information about features and operation of the XBee RF module mounted inside the gateway
- ConnectPort X2e ZB programming content within Digi ESP for Python
- The Wiki page for additional programming content for ConnectPort X2e products: http://www.digi.com/wiki/developer/index.php/ConnectPort_X2e
- The Programming section lists several references and tutorials for users new to a Linux-based filesystem and the ash command shell.iDigi Dia library documentation
- *iDigi User's Guide*
- *iDigi Web Services Programming Guide*
- iDigi tutorials and other documents available on iDigi.com

Hardware

CHAPTER 2

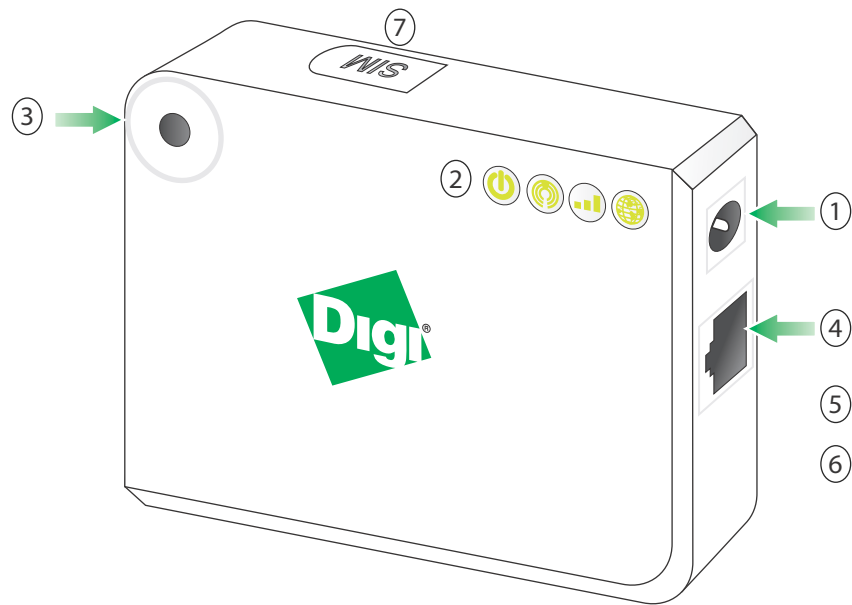
This section provides hardware specifications, reviews key hardware features, and lists regulatory statements and certifications of the ConnectPort X2e ZB.

ConnectPort X2e ZB Ethernet and Wi-Fi hardware



- 1 Power requirements. See page 17.
- 2 LED status indicators. See page 21.
- 3 Button. See page 25.
- 4 Ethernet features. See page 17.
- 5 Wi-Fi features. See page 18.
- 6 XBee RF module. See page 18.
- 7 Antennas (internal). See page 27.

ConnectPort X2e ZB Cellular hardware



- 1 Power requirements. See page 19.
- 2 LED status indicators. See the *Getting Started Guide* topic “Troubleshooting.”
- 3 Button. See page 25.
- 4 Cellular features. See page 20.
- 5 XBee RF module. See page 18.
- 6 Antennas (internal). See page 27.
- 7 SIM card installation. See the *Getting Started Guide* topic “Configuring for GSM Networks.”

Hardware specifications

.....

ConnectPort X2e ZB Ethernet and Wi-Fi

| Specification | | Value |
|--------------------|-----------------------------------|---|
| Environmental | Operating temperature | 32° F to 104° F (0° C to 40° C) |
| | Relative humidity | 5% to 95% (non-condensing) |
| | Storage and transport temperature | -40 to 185F (-40 to 85C) |
| | Altitude | 6560 feet (2000 meters) |
| | Ethernet isolation | 500 VAC min per IEEE802.3/ANSI X3.263 |
| Power requirements | DC power input | <ul style="list-style-type: none"> ■ Voltage input: 5 VDC +/- 5% ■ Power consumption: Typical: 1.2 W, Max: 2.5 W ■ Connector: 2.35mm x 5.7mm, center pin positive. |
| Dimensions | Length | 3 in (7.62 cm) |
| | Width | 3 in (7.62 cm) |
| | Depth | 1 in (2.54 cm) |
| | Weight | 0.15 lb (0.07 kg) |
| Ethernet | Ethernet Ports | 1 RJ-45 port |
| | Physical Layer | 10/100 Base-T (Auto-MDIX) |
| | Data Rate | 10/100 Mbps (auto-sensing) |
| | Mode | Full or half duplex (auto-sensing) |

| Specification | | Value |
|---|-------------------------------|---|
| Wi-Fi | 802.11 | b/g/n (2.4GHz only) |
| | Data Rate | Up to 72.2 Mbps |
| | Transmit Power | 18 dBm typical (varies by mode and channel) |
| | Receiver Sensitivity | -87 dBm @ 11 Mbps |
| | Modes | Infrastructure Client mode only |
| XBee See the <i>XBee/XBee-PRO ZB SMT RF Modules Product Manual</i> (90000976) for complete specifications and product information. | Module type | XBee® ZB SMT |
| | Transmit power | <ul style="list-style-type: none"> ■ The Domestic product version uses the XBee-PRO RF module, with a transmit power of 63mW (+18dBm). ■ The International product version uses the regular XBee RF module, with a transmit power of 6.3 mW (+8 dBm). |
| | Receiver sensitivity (1% PER) | -102 dBm |
| Development | Python version | 2.7.1 |
| | Memory | 64 MB RAM, 128 MB Flash 20 MB RAM 20 MB Flash available for Python applications |

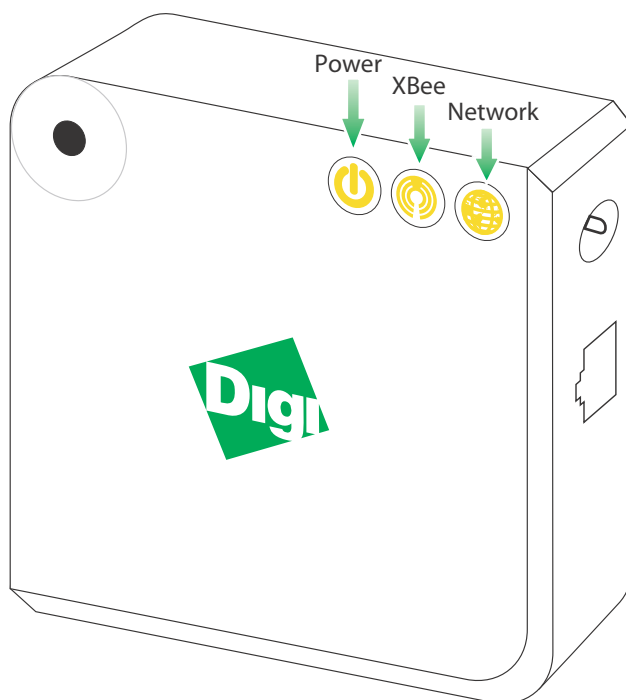
ConnectPort X2e ZB Cellular

| Specification | | Value |
|--------------------|-----------------------------------|--|
| Environmental | Operating temperature | 32° F to 104° F (0° C to 40° C) |
| | Relative humidity | 5% to 95% (non-condensing) |
| | Storage and transport temperature | -40 to 185F (-40 to 85C) |
| | Altitude | 6560 feet (2000 meters) |
| | Ethernet isolation | 500 VAC min per IEEE802.3/ANSI X3.263 |
| Power requirements | DC power input | <ul style="list-style-type: none"> ■ Voltage input: 5 VDC +/- 5% ■ Power consumption: Typical: Typical: 3.5W, Max: 15W ■ Connector: 2.5mm x 5.7mm, center pin positive. |
| Dimensions | Length | 4 in (10.16 cm) |
| | Width | 3 in (7.62 cm) |
| | Depth | 1 in (2.54 cm) |
| | Weight | 0.37 lb (0.082 kg) |
| Ethernet | Ethernet Ports | 1 RJ-45 port |
| | Physical Layer | 10/100 Base-T (Auto-MDIX) |
| | Data Rate | 10/100 Mbps (auto-sensing) |
| | Mode | Full or half duplex (auto-sensing) |

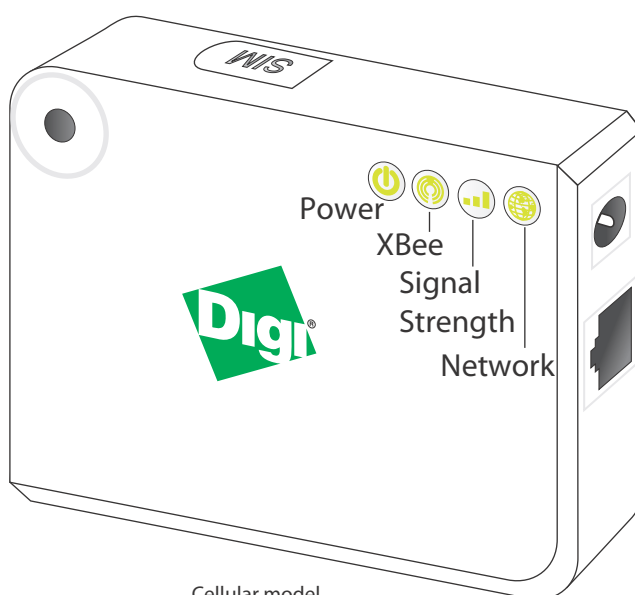
| Specification | | Value |
|--|-------------------------------|---|
| Cellular | EDGE | 850, 900, 1800, 1900 MHz |
| | GSM | UMTS / HSPA 800/850, 900, 1700 (AWS), 1900, 2100 MHz |
| | CDMA | 1xRTT 800, 1900 MHz EV-DO 800, 1900 MHz |
| | Internal Antenna: | |
| | ■ Frequencies | 24 – 960MHz to 1700 – 2170MHz |
| | ■ VSWR | 3:1 max |
| | ■ Polarization | Linear |
| | ■ Impedance | 50 Ohm |
| XBee See the <i>XBee/XBee-PRO ZB SMT RF Modules Product Manual</i> (90000976) for complete specifications and product information. | Module type | XBee® ZB SMT |
| | Transmit power | <ul style="list-style-type: none"> ■ The Domestic product version uses the XBee-PRO RF module, with a transmit power of 63mW (+18dBm). ■ The International product version uses the regular XBee RF module, with a transmit power of 6.3 mW (+8 dBm). |
| | Receiver sensitivity (1% PER) | -102 dBm |
| Development | Python version | 2.7.1 |
| | Memory | 64 MB RAM, 128 MB Flash 20 MB RAM 20 MB Flash available for Python applications |

LEDs

The ConnectPort X2e ZB has several LEDs. All LEDs have default behaviors, described in this section. LED descriptions are in the “Troubleshooting” section of the *Getting Started Guide*. Some LEDs can also be controlled programmatically, as discussed in "LED control" on page 89.



Ethernet and Wi-Fi models



Cellular model

Power LED

| Color and blink pattern | Description |
|---|---|
| Off | No power. |
| Solid green | Device is powered. This state does not indicate that the device is fully operational. The Network LED and its states convey such information. |
| Blinking green (Cellular model only) | Device is updating firmware. Do not unplug unit. |

XBee LED

The XBee LED indicates the status of the connection of the XBee RF module in the ConnectPort X2e ZB to an XBee wireless network. The behavior of the XBee LED varies depending on whether the ConnectPort X2e ZB acts as a coordinator or a router. For information on changing the ConnectPort X2e ZB from a coordinator to a router, see the *XBee/XBee-PRO ZB SMT RF Modules Product Manual*.

ConnectPort X2e ZB as Coordinator

| Color and blink pattern | Description |
|-------------------------|---|
| Solid green | The XBee RF module has not started a network. |
| Blinking green | The XBee RF module has started a network. |

ConnectPort X2e ZB as Router

| Color and blink pattern | Description |
|-------------------------|--|
| Solid green | The XBee RF module has not joined a network. |
| Blinking green | The XBee RF module has joined a network. |

Signal strength LED

| Color and blink pattern | Description |
|-------------------------|--|
| OFF | No or poor cellular signal. Moving device to a better location is recommended. |
| Solid yellow | Adequate cellular signal. This signal strength works for most applications. |
| Solid green | Good cellular signal. |

Network LED

The Network LED indicates the status of the connection of the ConnectPort X2e ZB to both a communications network and an iDigi server. The LED can be user-controlled; see page 89 for details.

| Color and blink pattern | Ethernet | Wi-Fi | Cellular |
|--------------------------------------|---|--|--|
| Off | No Ethernet detected. | No Wi-Fi AP or Ad-Hoc networks detected. | No cellular network detected. |
| Blinking yellow (slow) | Ethernet interface identified; waiting for link. | Wi-Fi AP or Ad-Hoc network detected. Connecting to Wi-Fi. Waiting for association. | Cellular network(s) detected. Registering on cellular network. |
| Blinking yellow (fast) | Connected to Ethernet. Establishing LAN connection. Waiting for IP address. | Connected to Wi-Fi. Establishing LAN connection. Waiting for IP address. | Registered on cellular network. Establishing WAN connection. Waiting for IP address. |
| Solid yellow | An IP address has been assigned to the gateway. Connected to LAN. Waiting for iDigi service to take control, and for DNS resolution of server chosen by the iDigi service. | An IP address has been assigned to the gateway. Connected to LAN. Waiting for iDigi service to take control, and for DNS resolution of server chosen by the iDigi service. | An IP address has been assigned to the gateway. Connected to WAN. Waiting for iDigi service to take control, and for DNS resolution of server chosen by the iDigi service. |
| Alternating between yellow and green | The gateway cannot connect to iDigi. The two most common reasons for this state are: <ul style="list-style-type: none"> ■ The gateway cannot connect to a DNS server to resolve the iDigi server address. See page 91. ■ The gateway cannot connect to an NTP time server to get the correct time. See page 91. | | |
| Blinking green (slow) | Verifying Internet connection. Waiting for network connection to the chosen server. | | |
| Blinking green (fast) | Connected to Internet. Establishing iDigi connection. Waiting for protocol level “connection” with iDigi server, which might include authentication. | | |
| Solid green | Gateway is connected to the iDigi server. | | |

Button

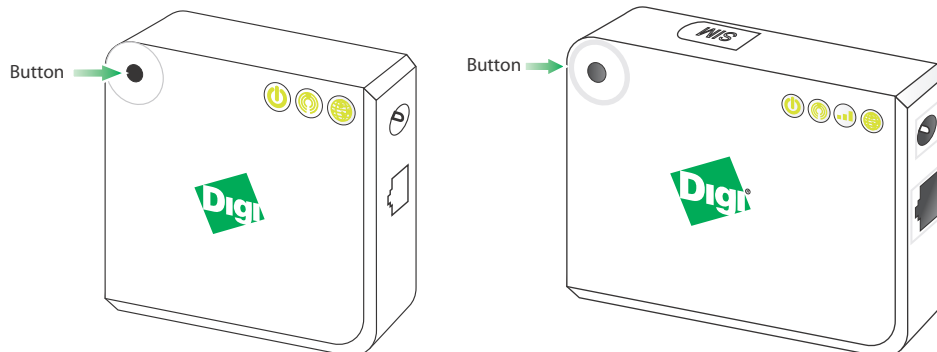
The button on the ConnectPort X2e ZB is capable of performing a number of Digi-defined actions, including:

- Reset the device configuration settings to their factory defaults
- Enable configuration changes via the device discovery tools within a five-minute window
- Enable the device web interface
- Enable a special purpose Wi-Fi configuration mode

Some of these features are enabled on the button by default, but all behaviors can be assigned either to the “default” button, or to “none” (to disable the feature); see below for detailed descriptions of these features. This assignment is done through the iDigi Manager Pro interface, in

Properties > Advanced Configuration > Button Service Assignment. The choices for each button service assignment are “**Default button,**” “**per Digi product specification,**” which means to use the default behaviors described on the following page, and “**Feature disabled,**” which means that the feature is not assigned to the button.

The button state can also be read by a Python application. This can be done in conjunction with the Digi standard actions, the button behaviors can be enabled/disabled individually, or all Digi behaviors can be disabled to provide full responsibility for the button to an application. See “Button handling” on page 88 for details.



Factory reset

Pressing the button for over 10 seconds after the ConnectPort X2e ZB is running resets the device to its factory default configuration. This action clears any configuration settings you may have entered through the supported device interfaces. This feature is assigned to the button by default.

Enable configuration changes via the device discovery tools

The default behavior for the ConnectPort X2e ZB is that it can be discovered through Digi Device Discovery and configuration settings can be displayed and changed, with no time-limit window; therefore, the button behavior is disabled. This feature, when enabled, restricts device state changes via the device discovery tools to a five-minute window since the most-recent button press.

Note: When an attempt is made to change configuration settings using the Digi Device Discovery tool, a password prompt will be displayed. Leave the field in the prompt blank and click **OK**.

Enable the device web interface

The default behavior for the ConnectPort X2e ZB is that the feature of controlling whether the web interface is exposed is disabled. That is, the web interface is always available and no button press is needed to access the web interface. When this feature is assigned to the button, and web interface availability is restricted, a user needs to press the button to access the web interface. The web interface will be open for a five minute window since the most recent button press.

Enable a special-purpose Wi-Fi configuration mode

When assigned to the button, the feature of enabling a special-purpose Wi-Fi configuration mode allows a button press to create a temporary access point for configuration of the device *if* the device has not yet already been configured for Wi-Fi. Each button press extends the window of access point mode operation to five minutes from the time of the button press. If the feature is not assigned to the button, no Wi-Fi configuration access point mode is available. The default behavior on the ZB is the feature is assigned to the button.

When the special-purpose Wi-Fi configuration mode is enabled, enable Access Point mode on your device by pressing the button. Configure the Wi-Fi interface of your laptop to connect to the ConnectPort X2e ZB gateway's access point. The name (SSID) of the access point will be **cpx2e-zb-xxxxxxxxxx**, where **xxxxxxxxxx** is the serial number of the gateway.

Antennas

The ConnectPort X2e ZB has internal antennas.

- All models have an internal antenna for the XBee RF module.
- Wi-Fi models have an additional internal antenna.
- Cellular models have an additional internal cellular antenna. For these models, if the Signal Strength LED is off, try moving the device to another location to improve signal strength. Placement can drastically increase the signal strength of a cellular connection. Often times, just moving the router closer to an exterior window or to another location within the facility can result in optimum reception. Another way of increasing throughput is by physically placing the device on the roof of the building, in an environmentally safe enclosure with proper moisture and lightning protection.

Regulatory information and certifications

.....

RF exposure statement

In order to comply with RF exposure limits established in the ANSI C95.1 standards, the distance between the antenna or antennas and the user should not be less than 20 cm.

FCC certifications and regulatory information (USA only)

FCC Part 15 Class B

Radio Frequency Interface (RFI) (FCC 15.105)

This device has been tested and found to comply with the limits for Class B digital devices pursuant to Part 15 Subpart B, of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Labeling Requirements (FCC 15.19)

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

If the FCC ID is not visible when installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module FCC ID.

Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by Digi may void the user's authority to operate this equipment.

European Community - CE Mark Declaration of Conformity (DoC)

We:

Manufacturer's Name: Digi International

of:

Corporate Headquarters: 11001 Bren Road East
Minnetonka MN 55343

Manufacturing Headquarters: 10000 West 76th Street
Eden Prairie MN 55344

Declare under our sole responsibility that the product:

| Product Name | Model Number |
|---------------------|---------------------|
| ConnectPort X2e ZB | 50X2E-Z3C-XXX-XX |

to which this declaration relates are in conformity with the essential requirements and other relevant requirements of Directive 1999/5/EC (R&TTE):

- Safety (article 3.1a)
 - EN 60950-1:2006
- EMC (article 3.1b)
 - EN 55022:2010 Class B
 - EN 55024:2010
 - EN 61000-3-2:2006
 - EN 61000-3-3:2008
 - EN 301 489-17 V2.1.1:2009 Class B
 - EN 301 489-7 V1.3.1
 - EN 301 489-24 V1.5.1
- Spectrum (article 3.2)
 - EN 300 328 V1.7.1:2006
 - EN 301 511 V9.02
 - EN 301 908-1 V4.2.1
 - EN 301 908-2 V4.2.1

Industry Canada (IC) certifications

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

Safety statements

Important Safety Information



To avoid contact with electrical current:

- Never install electrical wiring during an electrical storm.
- Never install an Ethernet connection in wet locations unless that connector is specifically designed for wet locations.
- Use caution when installing or modifying lines.
- Use a screwdriver and other tools with insulated handles.
- Wear safety glasses or goggles.
- Do not place Ethernet wiring or connections in any conduit, outlet or junction box containing electrical wiring.
- Installation of inside wire may bring you close to electrical wire, conduit, terminals and other electrical facilities. Extreme caution must be used to avoid electrical shock from such facilities. Avoid contact with all such facilities.
- Ethernet wiring must be at least 6 feet from bare power wiring or lightning rods and associated wires, and at least 6 inches from other wire (antenna wires, doorbell wires, wires from transformers to neon signs), steam or hot water pipes, and heating ducts.
- Do not place an Ethernet connection where it would allow a person to use an Ethernet device while in a bathtub, shower, swimming pool, or similar hazardous location.
- Protectors and grounding wire placed by the service provider must not be connected to, removed, or modified by the customer.
- Do not touch uninsulated Ethernet wiring if lightning is likely!
- External Wiring: Any *external* communications wiring installed needs to be constructed to all relevant electrical codes. In the United States this is the National Electrical Code Article 800. Contact a licensed electrician for details.

5.10 Ignition of Flammable Atmospheres

Warnings for Use of Wireless Devices

Observe all warning notices regarding use of wireless devices.



Potentially Hazardous Atmospheres

Observe restrictions on the use of radio devices in fuel depots, chemical plants, etc. and areas where the air contains chemicals or particles, such as grain, dust, or metal powders, and any other area where you would normally be advised to turn off your vehicle engine.

Safety in Aircraft

Switch off the wireless device when instructed to do so by airport or airline staff. If the device offers a 'flight mode' or similar feature, consult airline staff about its use in flight.

Safety in Hospitals

Wireless devices transmit radio frequency energy and may affect medical electrical equipment. Switch off wireless devices wherever requested to do so in hospitals, clinics, or health care facilities. These requests are designed to prevent possible interference with sensitive medical equipment.

Pacemakers

Pacemaker manufacturers recommended that a minimum of 15cm (6 inches) be maintained between a handheld wireless device and a pacemaker to avoid potential interference with the pacemaker. These recommendations are consistent with independent research and recommendations by Wireless Technology Research.

Persons with Pacemakers:

- Should ALWAYS keep the device more than 15cm (6 inches) from their pacemaker when turned ON.
- Should not carry the device in a breast pocket.
- If you have any reason to suspect that the interference is taking place, turn OFF your device.

International EMC (Electromagnetic Emissions/Immunity/Safety) standards

This product complies with the requirements of following Electromagnetic Emissions/Immunity/Safety standards.

There are no user-serviceable parts inside the product. Contact your Digi representative through "Digi contact information" on page 8 for repair information.

| Emissions | Immunity | Safety |
|---|---|--|
| AS/NZS 4268:2008 (Amended by A1:2010) Class B (Wi-Fi only) AS/NZS CISPR 22:2009 Class B EN 301 489-17 V2.1.1:2009 Class B (Wi-Fi only) EN 55022:2010 Class B EN 61000-3-2:2006 EN 61000-3-3:2008 FCC Part 15 Subpart B Class B FCC Part 15 Subpart C (Wi-Fi only) ICES-003:2004 Class B RSS-Gen:2010 (Wi-Fi only) RSS-210:2010 (Wi-Fi only) | EN 301 489-17 V2.1.1:2009 (Wi-Fi only) EN 55024:2010 EN 301 489-24 V1.5.1 (Cellular only) | IEC 60950-1:2005 EN 60950-1:2006 UL 60950-1 CSA C22.2 No. 60950-1 |

Configuration

C H A P T E R 3

While the ConnectPort X2e ZB is designed to allow network communication with minimal configuration, there are several configuration settings that can be adjusted. This section covers those configuration settings and configuration of these settings from the web interface, and from iDigi Manager Pro.

Configuration can be performed programmatically

In addition to the methods described in this chapter, configuration can be performed programmatically, through iDigi Web Services, and natively using Python modules. See page 85.

Important configurable settings

For the ConnectPort X2e ZB, most settings have reasonable defaults that do not need to be changed. However, these are some important settings available in the configuration interfaces that get the device up and communicating.

- Ethernet IP network settings
- Wi-Fi settings
- Mobile settings
- NTP time server settings
- iDigi remote device management

Ethernet IP network settings

Ethernet IP network settings configure how the IP address of the Digi device for Ethernet network communications is obtained, either by DHCP or by using a static IP address, subnet mask, and default gateway, and Domain Name System (DNS) servers.

DHCP

The ConnectPort X2e ZB uses a DHCP server to obtain its IP address information, by default. A DHCP server needs to provide an IP address, subnet mask, default gateway, and Domain Name System (DNS) server for the device. If you disable DHCP, you must set all of these settings yourself.

In the absence of a DHCP server, a static IP address will need to be assigned, most easily by accessing the device Digi Device Discovery tool and changing the network settings through that interface.

IP Address

Subnet Mask

Default Gateway

These settings should be considered as a group, and only come into play when automatic IP address assignment is disabled.

- **IP Address:** The IP address is a 4-part ID assigned to network devices. IP addresses are in the form of 192.168.2.2, where each number is between 0 and 255.
- **Subnet Mask:** The Subnet Mask is combined with the IP address to determine which network this Digi device is part of. A common subnet mask is 255.255.255.0.
- **Default Gateway:** The IP address of the computer that enables this Digi device to access other networks, such as the Internet.

DNS servers

A DNS (Domain Name System) server is an Internet service that resolves domain names into IP addresses. Name resolution is important when connecting to iDigi, as the Digi servers are provided as fully-qualified domain names.

ConnectPort X2e ZB is capable of using up to three DNS servers. Up to two of these slots may be filled with DNS servers from dynamic IP assignment sources, leaving at least one slot always available for static DNS server configuration. A reasonable default is supplied for one static DNS server, but this default may not be appropriate for all customer networks.

Wi-Fi settings

If the ConnectPort X2e ZB will use Wi-Fi communications, several Wi-Fi settings are important to enable network connectivity.

- A **Wi-Fi configuration wizard** is used to configure the Wi-Fi interface. This wizard “teaches” a Wi-Fi ConnectPort X2e ZB device the wireless parameters needed to further configure wireless settings and operation.
- **SSID:** This value should be set to the name of your wireless access point. The wizard will display a list of access point names (SSIDs) select the name of your access point.
- **Network security:** The type of network security used on the wireless network will need to be specified. Select your network security from the list provided.

Mobile settings and provisioning

The mobile settings configure how to connect to mobile (cellular) networks using the mobile connection, including the service provider, service plan, and settings used in connecting to the mobile network.

The process for provisioning your device and the settings displayed on the Mobile Configuration page vary according to whether the mobile service provider network used with your Digi Cellular Family product is based on GSM (Global System for Mobile communication) or CDMA (Code-Division Multiple Access). If your device has not already been provisioned, see the *Getting Started Guide*.

SMS settings

An additional set of mobile settings configure the use of Short Message Service (SMS) communications for the ConnectPort X2e ZB. The SMS settings allow you to send messages and commands to and from the ConnectPort X2e ZB in the form of SMS messages. There are two types of SMS interactions supported: *iDigi SMS* and *Raw SMS messaging*.

iDigi SMS

The iDigi SMS feature supports sending and receiving SMS messages between iDigi and an iDigi-registered device. iDigi SMS can be used to:

- Send an SMS message to the iDigi device in order to have the iDigi device dynamically establish its EDP connection with iDigi
- Send user defined data to and from iDigi and iDigi devices
- Perform limited device management such as pinging the iDigi device, as well as provisioning it properly for SMS functionality with iDigi

With iDigi devices that support the iDigi SMS feature, iDigi can send an SMS message to the iDigi device instructing the device to establish its EDP connection to iDigi. Once the iDigi device has uploaded its data to iDigi, iDigi can then disconnect the EDP connection resulting in lower cellular data usage since the EDP connection no longer needs to be maintained around the clock.

iDigi SMS support makes sending data between iDigi devices and iDigi easy and reliable. This iDigi feature augments and overcomes the limitations of using basic SMS messages in several ways:

- Send request/response pairs allowing confirmation of messages, as well as allowing iDigi devices to respond to user commands sent through iDigi
- Send messages larger than a single SMS message. iDigi will automatically split up and re-assemble large messages into a multi-part message without requiring any user intervention.
- Send binary messages (basic SMS messages are limited to text only)
- Guarantee data integrity (basic SMS messages do not guarantee integrity)

Complete details on configuring and using iDigi SMS are in the *iDigi User's Guide*.

Raw SMS messaging

In addition to iDigi-formatted messages, a user can send an SMS message without iDigi modifying it any way. This method is referred to as “raw SMS messaging”. This type of messaging is useful in cases when customers wish to use every byte of the SMS message (the iDigi protocol takes approximately 5 bytes per message of overhead), or when using a device that doesn't have iDigi protocol support but does have SMS support.

Raw messages are not modified by iDigi and are subject to the restrictions of the SMS messaging interface. SMS raw messages are subject to the limitations of standard SMS messages: They can be a maximum of 160 characters. The supported characters are dependent on your carrier, but are character only (not binary). They are not guaranteed to be delivered, may be delivered more than once, and are not guaranteed to be correct (they are subject to corruption).

To learn more about this feature, see the *iDigi Web Services Programming Guide*.

Note: using SMS can involve additional costs

SMS is a feature that may be available as part of your mobile service agreement. However, sending and receiving short messages (or “text messages”) may have additional costs. Before using the SMS capabilities of your Digi device, verify with your mobile service provider that your agreement includes SMS as part of your service plan. Understand the costs of SMS before you enable the SMS features on this Digi device.

NTP time server settings

The ConnectPort X2e ZB uses Network Time Protocol (NTP) for time synchronization. Using NTP requires an external NTP time server. Time synchronization is critical to the security of the device, including validating the certificates that sign firmware update images, as well as to verify the server certificate if/when connecting to iDigi. Steps are taken to preserve a sense of the time across reboots, but the availability of an NTP server or servers is important to the long-term health of the device.

The NTP servers are configured in the web interface on the **Configuration > Time** page. In environments where the device cannot directly connect to the Internet, configuration changes to point to a local NTP server are important. Many users will not need to change the time server setting. If already connected to iDigi, it is also possible to adjust the time server configuration.

The default values for the NTP time server settings are as follows:

- **NTP server 1:** my.idigi.com
- **NTP server 2:** 0.idigi.pool.ntp.org
- **NTP server 3:** 1.idigi.pool.ntp.org
- **NTP server 4:** 2.idigi.pool.ntp.org
- **TimeZone:** Coordinated Universal Time (UTC)

iDigi remote device management

The ConnectPort X2e ZB, as with many of its predecessors, is compatible with the iDigi device and data management platform. iDigi provides a mechanism to do more advanced device configuration than is generally possible in the web interface. Once the device has established network connectivity to the iDigi server, it will be manageable remotely using the iDigi interface. Configurable iDigi settings include:

- **iDigi Connectivity:** Enabled by default. You may wish to disable this feature if you have no use for iDigi, and wish to eliminate any iDigi-related network traffic.
- **iDigi Server Name:** The value for this setting is generally a Fully Qualified Domain Name (FQDN) pointing to one of the Digi iDigi servers. This setting is configurable through the web interface, in the **Configuration > iDigi Connectivity** page, and through iDigi, in the Advanced configuration settings. The default value is **my.idigi.com**
- **iDigi Server Port:** This setting is configurable on the iDigi Configuration page, not through iDigi Manager Pro. The default value is **3199**
- **Proxy Server Name / Port:** A path to an iDigi server can be made through a local HTTP proxy, such as squid, provided that server is used to simply remap the target IP address and port number, without extra authentication or other security measures.

Additional device configuration settings

There are several additional device features that are not essential for IP network connectivity, but which will require configuration settings to be entered or changed from their defaults.

Python

Any Python programs loaded onto the ConnectPort X2e ZB can be configured to start automatically at system startup.

XBee settings

The ConnectPort X2e ZB provides a gateway between an Internet Protocol (IP) network wired or wireless devices and a network of various wireless devices containing XBee or ZigBee wireless RF modules. Typically, these wireless devices are small sensors and controllers. Remote nodes in an XBee network can be other Digi ZB or SE nodes, or 3rd-party nodes.

The XBee module can be configured as a coordinator or router in an XBee or ZigBee network. For information on configuring the XBee module as a coordinator or router, and for complete XBee module settings and their descriptions, and discussions of XBee network concepts, see the *XBee/XBee-PRO ZB SMT RF Modules Product Manual* (90000976).

SureLink™ settings

Digi SureLink™ is an optional feature that monitors the integrity of an established network connection. Several settings and tests can be configured to perform a selected test to examine the functional integrity of the network connection, and take action to recover the connection in the event that it is lost.

Currently SureLink is supported for cellular communications only. The SureLink feature and its settings are off by default, and must be enabled and configured. To configure SureLink from the web interface, see page 49. To configure SureLink from iDigi, see page 58.

Configuration from the Web interface

The web interface for ConnectPort X2e ZB is intended to support basic feature configuration as well as critical network configuration. Not every device setting is displayed in this interface. For more extensive access to settings, use the iDigi Manager Pro interface.

Open the web interface

To open the web interface, use the Digi Device Discovery utility in Digi ESP for Python to get the IP address for the device. The Digi Device Discovery utility locates Digi devices on a network. It uses a Digi International-proprietary protocol, Advanced Digi Discovery Protocol (ADDP), to discover the Digi devices on a network, and displays the discovered devices in a list. Digi Device Discovery can be launched from the Digi ESP for Python interface.

Note: If you already know the IP address for the device, you can open a web browser and enter the IP address in the address bar to open the web interface. For example <http://10.101.1.178>

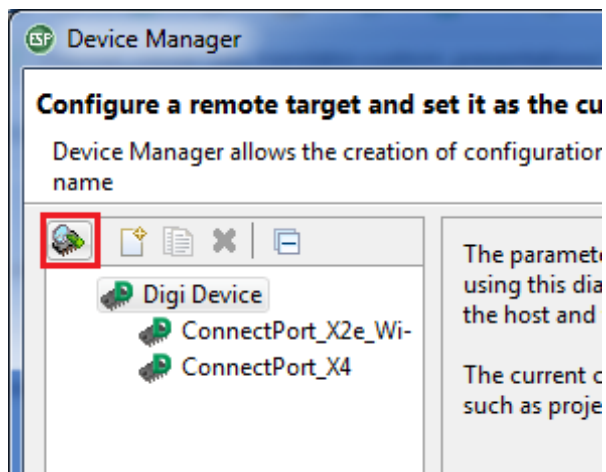
Launch Digi Device Discovery

To launch Digi Device Discovery within Digi ESP:

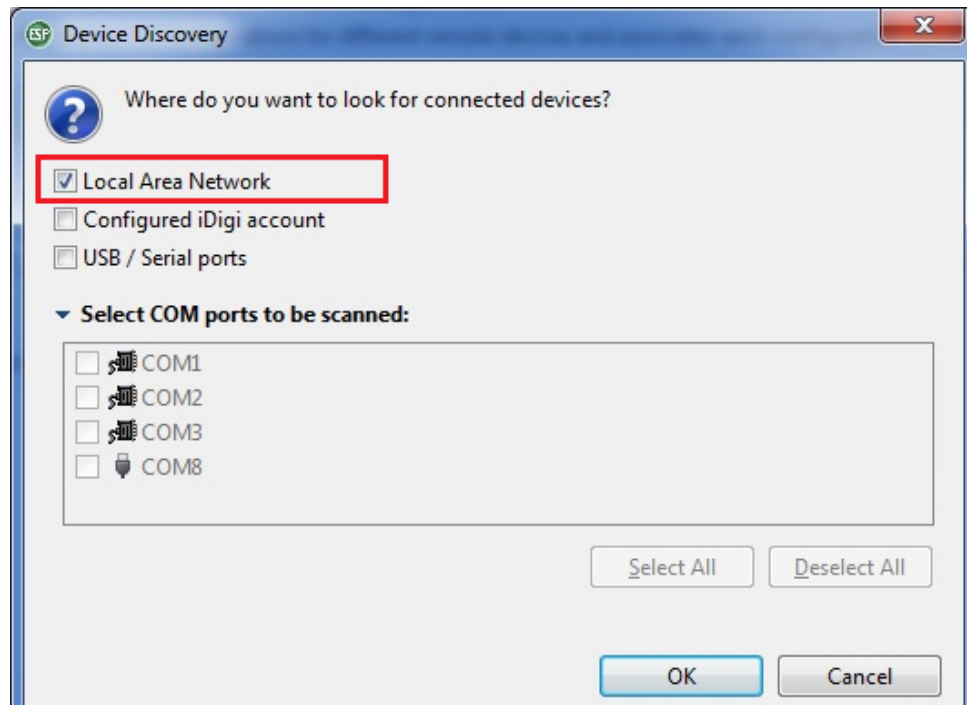
- 1 Launch Digi ESP from the Start menu: **Start > Digi > Python > Dev Tools... > Digi ESP for Python.**
- 2 Open the Device Manager: from the Digi ESP main menu, selecting **Device Options > Device Manager**, or on the toolbar, click the *Device Manager* button.



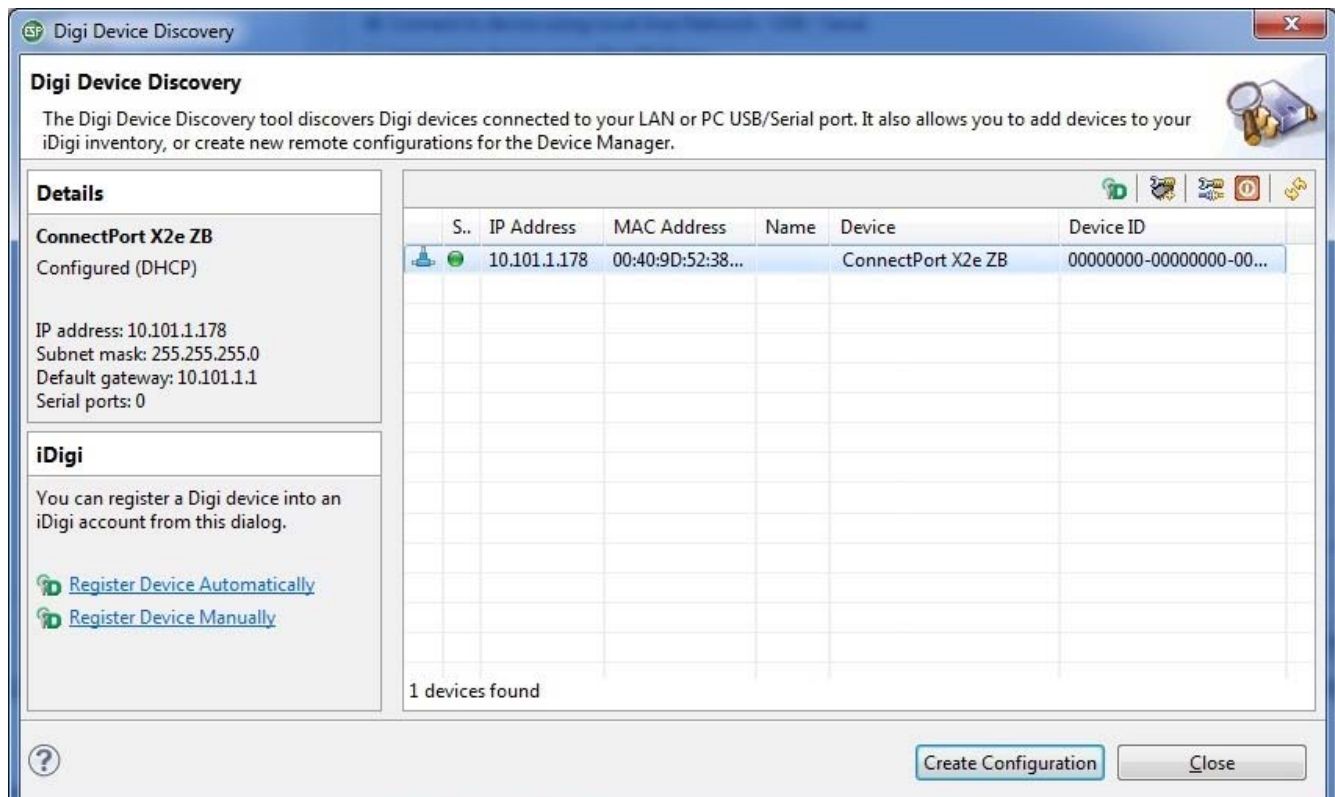
- 3 In the Device Manager window, click on the *Device Discovery* button located on the toolbar above the list of available remove devices.



- 4 A dialog is displayed for asking where to look for connected devices. Make sure the option **Local Area Network** is selected and click **OK**.



- 5 The **Digi Device Discovery** dialog is displayed, listing the devices found. The **IP Address** column displays the IP address of every device. Locate the device in the list of devices.



- 6 Open an internal browser within Digi ESP by choosing **Window > Show View > Other > Internal Web Browser**. Click **OK**.
- 7 In the browser, enter the IP address of your device, in the address bar of the browser:
http://device_ip_address
For example:
<http://10.101.1.178>

Note: Use of Digi Device Discovery within Digi ESP is covered further in the Digi ESP help topic **Help > Help Contents > Digi ESP for Python > Working with the IDE > Configuring Devices > Automatic Configuration**.

Configuration through Digi Device Discovery

A subset of configuration settings can be changed through Digi Device Discovery. When an attempt is made to change configuration settings is made, a password prompt will be displayed. Leave the field in the prompt blank and click **OK**.

The Home page

When the web interface is opened, the **Home** page is displayed. The information listed on this page may vary based on product and supported features. Here is a sample Home page for a ConnectPort X2e ZB Cellular model.



Device Configuration and Management

Home

Configuration

- Ethernet Network
- Mobile Connectivity
- SureLink
- Python
- Network Services
- Time
- iDigi Connectivity
- XBee Network

Administration

- File Management
- Firmware Update
- XBee Firmware Update
- XBee Status
- Mobile Status
- System Log
- Reboot

Device Information

Current System Parameters

| | |
|-----------------------|---|
| Model: | ConnectPort X2e ZB UMTS |
| Firmware Version: | 3.1.0.1 cpx2e-3g release gw-3.1.0.1 03/28/2013 11:44:19 CDT |
| Device ID: | 00000000-00000000-00409dff-ff5c196f |
| Date and Time: | Mon Apr 1 18:11:16 UTC 2013 |
| Ethernet MAC Address: | 00:40:9d:5c:19:6f |
| Ethernet IP Address: | 10.10.19.119 |
| DNS Servers: | 209.183.33.23,209.183.35.23,8.8.8.8 |

Network Connectivity Status ■

- ☒ Network interface detected.
- ☒ Connected to local network.
- ☒ IP address assigned.
- ☒ Prepared to contact iDigi server.
- ☒ Contacted iDigi server.
- ☒ Ready for iDigi communication.

Device Information

The **Device Information** section of the Home page summarizes current system parameters and network connectivity status.

The **Network Connectivity Status** LED and information displayed indicates the readiness of the ConnectPort X2e ZB to communicate in a network and with the iDigi server. See the description of the status LEDs beginning on page 21 and "Troubleshooting" on page 89 for information on the LED and the various network connectivity status conditions listed.

Refresh button

Clicking **Refresh** refreshes the Home page. This refresh operation is necessary because things like system time and network connectivity status are not dynamically updated when the state changes on the device. This refresh operation also updates device status information.

Configuration and Administration links

The left side of the Home page has a menu of choices that display pages for configuration and administration tasks.

The choices under **Configuration** in the menu display pages for configuring settings for various features. Some of the configuration settings are organized on sets of linked screens. The choices in this menu may vary based on product and supported features.

The choices under **Administration** complete common device administration tasks, and are covered in "Administration/maintenance" on page 64.

Apply and save changes

The web interface runs locally on the device, which means that the interface always maintains and displays the latest settings in the Digi device. On each screen, the **Apply** button is used to save any changes to the configuration settings to the Digi device.

Cancel changes

To cancel changes to configuration settings, click the **Refresh** or **Reload** button on the web browser. This causes the browser to reload the page. Any changes made since the last time the **Apply** button was clicked are reset to their original values.

Restore the Digi device to factory defaults

The device configuration can be reset to factory defaults as needed during the configuration process. See "Factory reset" on page 26. Note that any network configuration settings will have to be reset after the restore operation is complete.

Configuration settings pages

Ethernet Network

The **Ethernet Network** settings display the current IP address and DHCP settings for Ethernet network communications. The IP address can be changed, either by obtaining a new one through DHCP or by entering a static IP address.

The **Domain Name Service Configuration** show the two Domain Name System servers to be used as static servers when dynamic mechanisms do not supply enough DNS servers.

The **iDigi Service Configuration** has one setting, **Server Address**. This setting is the address of the iDigi server used to manage the ConnectPort X2e ZB. The **Configuration > iDigi Connectivity** page enables or disables the connection to the specified iDigi server.

Wireless Network

The **Wireless Network** settings display the current IP address and DHCP settings for Wi-Fi network communications. The IP address can be changed, either by obtaining a new one through DHCP or by entering a static IP address.

Wireless Wizard

The Wireless Wizard link launches a wizard that is used to “teach” a Wi-Fi ConnectPort X2e ZB device the wireless parameters needed to further configure wireless settings and operation. The wizard provides a place to copy in the information required for the to connect to your local WiFi network. In this instance, the ConnectPort X2e ZB is a Wi-Fi “client” connecting to an existing access point. The information you are required to enter in this wizard should be obtained from the network administrator for the wireless network the ConnectPort X2e ZB will use. To complete the wizard:

- 1 Enter the SSID, or choose an SSID from the list of values, if supplied. This selection is required.
- 2 Select the type of network security used on the wireless network.
- 3 Depending on the network security type, additional parameters can be entered.
- 4 Messages are displayed while the parameters are being processed and when the wizard is complete.

For security reasons, the wireless configuration resulting from running this wizard cannot be viewed, only modified by re-running the wizard.

Mobile Connectivity settings

The Mobile Connectivity settings identify the service provider to use in connecting to the mobile network. Information displayed varies by product and whether the device is GSM- or CDMA-based. In addition, the Short Message Service (SMS) can be enabled and configured on this page. For GSM-based devices, enter the information for your account received from the mobile service provider.

- **Current Status:** Current status of the cellular modem and mobile connection, including serial number information, signal strength and quality, and connection state.
- **Current Settings: For GSM-based devices,** the following settings are displayed.
For CDMA-based devices, no settings are displayed.
 - **Mobile APN:** The service plan or access point name (APN).
 - **Username:** The username of the mobile connection needed to access the mobile network. Depending on mobile service provider, this value may not be necessary.
 - **Password:** The username of the mobile connection needed to access the mobile network. Depending on mobile service provider, this value may not be necessary.
 - **SIM PIN:** A password that allows an administrator user of the device to access information on the SIM card. The password is usually between four and eight digits. SIM PINs act like ATM PINs in that they require users to authenticate themselves as the true owner of the card before information is released. Depending on mobile service provider, this value may not be necessary.

- **Short Message Service (SMS) Settings:** These options configure the cellular Short Message Service (SMS) capabilities of the cellular modem.
 - **Enable cellular Short Message Service (SMS) services:** Enables or disables SMS features on this Digi device. When this option is enabled, the remaining SMS options may be configured. This option is enabled (on) by default and can be disabled if desired. When SMS services are disabled, all SMS-related menu items in the web interface and iDigi are disabled/grayed-out.
 - **iDigi SMS Settings:** These settings configure the iDigi device to be managed by iDigi via Short Message Service (SMS) messages.
 - **Enable iDigi SMS:** Enables or disables iDigi SMS support.
 - **Opt-in:** Enables or disables the iDigi SMS opt-in feature. By default, ConnectPort X2e ZB Cellular models are configured to automatically register with the iDigi Technical Support when you first power up your device. Activation with iDigi Technical Support is free. Our iDigi Technical Support team will only access your device upon your approval. With your consent, the iDigi Technical Support team is afforded visibility and access to your device to diagnose and resolve issues, should you require assistance. In the automatic registration process, ConnectPort X2e ZB Cellular models attempt to send a single SMS message containing the device's mobile phone number. Your cellular account must be set up to send and receive SMS messages. Network costs associated with this single SMS transmission are the customer's responsibility. Any device information stored in the iDigi Technical Account is secured with adherence to iDigi's security and privacy procedures, and will not be disclosed to, or accessible by third parties.
 - **Restrict Sender:** Only process inbound messages for iDigi from the number specified in the **Phone Number** setting. Messages from other phone numbers will be passed on to other SMS Services on the device.
 - **Phone Number:** The phone number or short code of the iDigi server. This is a setting in the device that allows the device to send to the iDigi server, and possibly restrict messages to those coming from the iDigi server. The default value phone number is **32075**.
 - **Service Identifier:** The Service Identifier (prefix) of iDigi. This field is an optional setting and is used in cases where there is a shared short code in use, and an identifier (prefix) is required to redirect a message to a specific service under that short code. The default value is **idgp**. Use of the Service Identifier **idgp** is mandatory when the Phone Number is **32075**.

SureLink™ Configuration settings

Digi SureLink™ is an optional feature that monitors the integrity of an established network connection. Several settings and tests can be configured to perform a selected test to examine the functional integrity of the network connection, and take action to recover the connection in the event that it is lost.

Currently SureLink is supported for cellular communications only.

The **Link Integrity Monitoring settings** can be configured to perform a selected test to examine the functional integrity of the network connection, and take action to recover the connection in the event that it is lost.

Link integrity monitoring settings

- **Enable Link Integrity Monitoring using the test method selected below:** Enables or disables the link integrity monitoring tests. If this setting is enabled, the other Link Integrity Monitoring settings may be configured and are used to verify the functional integrity of the mobile connection. The default is off (disabled).

There are several tests available:

- Ping Test
- TCP Connection Test
- DNS Lookup Test
- iDigi Connection Test

You can use these tests to demonstrate that two-way communication is working over the mobile connection. Several tests are provided because different mobile networks or firewalls may allow or block Internet packets for various services. Select the appropriate test may be selected according to mobile network constraints and your preferences.

The link integrity tests are performed only while the mobile connection is established. If the mobile connection is disconnected, the link integrity tests are suspended until the connection is established again.

For the link integrity tests to provide meaningful results, the remote or target hosts must be accessible over the mobile connection and not through the LAN interface of the device (if it has one). That is, the settings should be configured to guarantee that the mobile connection is actually being tested.

The link integrity test settings may be modified at any time. The changes are used at the start of the next test interval.

- **Ping Test:** Enables or disables the use of “ping” (ICMP) as a test to verify the integrity of the mobile connection. The test is successful if a valid ping reply is received in response to the ping request sent. The ping test actually sends up to 30 ping requests, one per second, to test the link. When a valid reply is received, the test completes successfully and immediately. If a reply is received for the first request sent, there is no need to send the other two requests.

Two destination hosts may be configured for this test. If the first host fails to reply to all three ping requests, the same test is attempted to the second host. If neither host replies to any of the ping requests sent, the test fails. The primary and secondary addresses may be either IP addresses or fully qualified domain names.

- **Primary Address:** First host to test.
- **Secondary Address:** Second host to test (if the first host fails).

- **TCP Connection Test:** Enables or disables the creation of a new TCP connection as a test to verify the integrity of the mobile connection. The test is successful if a TCP connection is established to a specified remote host and port number. If the remote host actively refuses the connection request, the test is considered a failure. The TCP connection test waits up to 30 seconds for the connection to be established or refused. When the TCP connection is established, the test completes successfully, and the TCP connection is closed immediately.

Two destination hosts may be configured for this test. If the first host fails to establish (or refuse) the TCP connection, the same test is attempted to the second host. If neither host successfully establishes (or refuses) the TCP connection, the test fails. The primary and secondary addresses may be either IP addresses or fully qualified domain names.

- **TCP Port:** The TCP port number to connect to on the remote host. The default is 80.

- **DNS Lookup Test:** Enables or disables the use of a Domain Name Server (DNS) lookup as a test to verify the integrity of the mobile connection. The test is successful if a valid reply is received from a DNS server. Typically, this means the hostname is successfully “resolved” to an IP address by a DNS server. But even a reply such as “not found” or “name does not exist” is acceptable as a successful test result, since that demonstrates successful two-way communication over the mobile connection. When a valid reply is received, the test completes successfully and immediately.

The DNS servers used in this test for the hostname lookup, are the primary and secondary DNS servers obtained from the mobile network when the mobile PPP connection is first established. These addresses can be viewed on the **Administration > Mobile Status** page.

- **iDigi Connection Test:** Enables or disables verification of the iDigi connection. The test is successful if a connection can be established to the configured iDigi server, and if keep-alive messages can be exchanged with the server. The test fails if a connection cannot be established, the connection is closed, or if keep-alive messages stop. The iDigi server is configured on the Configuration/iDigi Connectivity page.

- **Repeat the selected link integrity test every N seconds:** Specifies the interval, in seconds, at which the selected test is initiated (repeated). A new test will be started every N seconds while the mobile connection is established. This value must be between 10 and 65535. The default is 240. This setting is used by Ping, TCP Connection, and DNS Lookup tests only, not iDigi Connection.

If the configured interval is less time than it takes a test to complete, the next test will not be initiated until the previous (current) test has completed.

- **Test only when idle if no data is received for the above period of time:** Specifies that the test repeat interval (above) is to be used as an idle period interval. That is, initiate the selected link integrity test only after no data has been received for the specified interval of time. This changes the behavior of the test in that the test interval varies according to the presence of other data received from the mobile connection. This setting is used by Ping, TCP Connection, and DNS Lookup tests only, not iDigi Connection.

Although using this idle option may result in less data being exchanged over the mobile connection, it also prevents the link integrity tests from running as often to verify the true bi-directional state of that connection.

- **Reset or Reconnect the link after the following number of consecutive link integrity test failures:** Specifies that after the configured number of consecutive link integrity test failures, the mobile connection should be either reset or reconnected:

- **Reset:** The cellular modem is reset.
- **Reconnect:** The mobile interface is reconnected.

This value must be between 1 and 255. The default is 3. When the mobile connection is reestablished, the “consecutive failures” counter is reset to zero.

If the mobile connection is disconnected for any reason (including not as a result of a link integrity test failure), the consecutive failures count is reset to zero when the mobile connection is reestablished.

- **Primary Test Hostname:**
Secondary Test Hostname:

These settings apply to Ping, TCP Connection, and DNS Lookup tests only. Two hostnames may be configured for the link integrity monitoring test. Hostnames can be specified in the form of domain names or IP addresses. If the first hostname fails to get a reply, the same test is attempted for the second hostname. If no reply is received for either hostname, the test fails. The primary and secondary DNS names should be fully qualified domain names. Note that the reverse lookup of an IP address is possible, but that is usually unlikely to succeed in returning a name. Still, such a reverse lookup can be used to demonstrate the integrity of the mobile connection.

- **Primary Test Hostname:** The first hostname to look up.
- **Secondary Test Hostname:** The second hostname to look up (if the first hostname fails).

Status and statistical information for mobile connections

Once the mobile settings have been configured, you can monitor the status of mobile connections by going to **Administration > Mobile Status**. See "Mobile Status" on page 67.

Python: configure automatic starting and exit conditions for Python programs

The **Python Autostart Configuration** page configures the automatic starting of Python programs that are loaded on the ConnectPort X2e ZB device. See "File management" on page 65 for details on loading files. These programs are executed through the specified "python" commands.

Select the **Enabled** checkbox to set the program to be automatically started at system startup.

In the **Command** field, enter the name of the Python file to be started, and any program arguments.

The **On Exit Action** setting controls the action to be performed in the event the program exits.

- **Do Nothing:** Continue device operation without doing anything about the program.
- **Reboot:** Reboot the device.
- **Restart the Script:** Restart the Python program.

For example:

Python Autostart Configuration

Current Settings

| Enabled | Command | On Exit Action |
|-------------------------------------|---------------------|----------------|
| <input checked="" type="checkbox"/> | collect_readings.py | Do Nothing ▼ |
| <input type="checkbox"/> | | Do Nothing ▼ |
| <input type="checkbox"/> | | Do Nothing ▼ |
| <input type="checkbox"/> | | Do Nothing ▼ |

Network Services

The **Network Services** page enables or disables common network services that are available on the ConnectPort X2e ZB, and configures the network port on which the service is listening. Disabling services may be done for security purposes. That is, certain services can be disabled so the device runs only those services specifically needed and to improve device security.

The only configurable network services on the ConnectPort X2e ZB are HTTP, HTTPS, and SSH. Following is more information about each service and its default network port number. It is usually best to use the default network port numbers for these services because they are well known by most applications.

| Service | Services provided | Default network port number |
|---|---|-----------------------------|
| HyperText Transfer Protocol (HTTP), also known as Web Server | Access to web pages for configuration that can be secured by requiring a user login. HTTP and HTTPS, below, are also referred to as Web Server or Secure Web Server. These services control the use of the web interface. If HTTP and HTTPS are disabled, device users cannot use the web interface to configure, monitor, and administer the device. | 80 |
| HyperText Transfer Protocol over Secure Socket Layer (HTTPS), also known as Secure Web Server | Access to web pages for configuration that can be secured by requiring a user login with encryption for greater security. | 443 |
| Secure Shell Server (SSH) | Allows users secure access to log in to the Digi device and access the command-line interface. | 22 |

Time

The **Time Configuration** page configures the various Network Time Protocol (NTP) servers that the ConnectPort X2e ZB uses to obtain current date and time, and the time zone for the NTP server. The default settings for this feature are likely to be sufficient for many users.

iDigi Connectivity

The **iDigi Connectivity** page enables/disables the connection to the iDigi server used for managing the ConnectPort X2e ZB device, configures the iDigi server, and configures the proxy server, if used.

- **iDigi Connectivity:** Enables or disables the connection to the iDigi server.
- **iDigi Server Name/ iDigi Server Port:** Obtain this value from your iDigi server administrator. Typically this administrator is Digi. If your enterprise has its own iDigi server rather than one provided by Digi, enter your enterprise-specific iDigi server information here.
- **Proxy Server Name/port:** These values configure which system will provide network access, and which port number will forward network connection attempts to the iDigi server. Obtain these values from your iDigi server administrator.

XBee Network

The ConnectPort X2e ZB provides a gateway between an Internet Protocol (IP) network and a network of various wireless devices containing XBee RF modules. Typically, these XBee devices are small sensors and controllers.

- **Current Devices:** Displays a view of XBee network devices, including the ConnectPort X2e ZB gateway and any nodes that have been discovered by the XBee module in the ConnectPort X2e ZB gateway. Each node displayed provides this information:
- **Node ID:** A descriptive, user-friendly name for the device. The Node ID is a 20-byte printable ASCII string that allows for referencing devices by names rather than their physical addresses.
- **Network:** A 16-bit network address for the device.
- **Extended address:** A static 64-bit address for the device that is a guaranteed to be unique.
- **Node type:** The node type for the device, or role it plays in the XBee network: **coordinator** or **router**.
- **Product type:** A description of the product type for the node, such as “X2e Gateway.”
- **Apply:** Applies the changes to the Node ID for the node.
- **Refresh:** refreshes the list of nodes that have joined the XBee network. (Note that the discovery operation may take a few seconds.) Refresh lists only nodes that respond to the discovery operation. Previous nodes are cleared from the list. Sleeping or unresponsive nodes may not be listed immediately, but may later appear in the list.

Configuration from iDigi Manager Pro

The *iDigi User's Guide* describes how to set up an iDigi account and add devices to the iDigi Manager Pro device list. Once your ConnectPort X2e ZB is added to the device list, you can view the device in the device list and access its configuration settings.

The screenshot displays the iDigi Manager Pro web interface. The top navigation bar includes links for WELCOME, IDIGI MANAGER PRO (active), DATA SERVICES, SECURITY, ADMIN, and HELP & API EXPLORER. Below this is a secondary navigation bar with tabs for Devices, XBee Networks, Alarms, Operations, Schedules, and Carrier. The main content area shows a table of devices with columns for MAC Address, Device ID, IP Address, Device Type, Description, and Firmware Level. A map at the bottom shows the location of the devices, with a blue dot indicating a device in the United States.

| MAC Address | Device ID | IP Address | Device Type | Description | Firmware Level |
|---------------|-------------------|-----------------|---------------------------------|----------------------------------|----------------|
| 00409D-552A02 | 00409DFF-FF552A02 | 192.168.250.4 | Wireless Vehicle Bus Adapter | | 3.1.1.0 |
| 00409D-3B6B52 | 00409DFF-FF3B6B52 | 10.9.92.104 | ConnectPort X4 NEMA | Modbus test for XBee DigMesh 2.4 | 2.13.0.4 |
| 00409D-6877C4 | 00409DFF-FF6877C4 | 184.243.238.250 | ConnectPort X2e ZB EVDO Sprint | | 3.1.0.1 |
| 00409D-552A03 | 00409DFF-FF552A03 | 192.168.250.20 | ConnectPort X2e ZB | | 3.1.1.0 |
| 00409D-552A34 | 00409DFF-FF552A34 | 192.168.250.10 | ConnectPort X2e ZB Wi-Fi | | 3.1.1.0 |
| 00409D-5211A3 | 00409DFF-FF5211A3 | 10.52.18.99 | ConnectPort X2e ZB Wi-Fi | | 3.0.10.1 |
| 00409D-687764 | 00409DFF-FF687764 | 80.187.238.205 | ConnectPort X2e ZB UMTS | | 3.0.8.7 |
| 00409D-6877BC | 00409DFF-FF6877BC | 75.238.149.74 | ConnectPort X2e ZB EVDO Verizon | | 3.1.0.1 |
| 00409D-552A1F | 00409DFF-FF552A1F | 192.168.250.36 | ConnectPort X2e SE Wi-Fi | | 3.1.1.0 |
| 00409D-552A01 | 00409DFF-FF552A01 | 192.168.250.16 | ConnectPort X2e SE | | 3.1.1.0 |

Basic configuration settings

In the iDigi Manager Pro interface, basic configuration settings for the ConnectPort X2e ZB are accessed by right-clicking the device in the device list and selecting **Properties**. The basic configuration settings located in this menu are:

- Ethernet settings
- Wi-Fi settings
- Domain Name Server (DNS)
- Python

There are several other operations on the context menu, such as **File Management**, **System Information**, and **Connection History**. These operations are important for administrative and troubleshooting tasks and are discussed elsewhere in this guide.

Advanced configuration settings

Advanced configuration settings for the ConnectPort X2e ZB are accessed by right-clicking the device in the device list and selecting **Properties > Advanced Configuration**. The settings available in this menu vary by model. This section discusses several but not all Advanced Configuration settings.

Mobile Connectivity

The Mobile Connectivity settings identify the service provider to use in connecting to the mobile network. Information displayed is currently the same for GSM- or CDMA-based products. Some values may be hidden, depending on your model.

For GSM-based devices, these settings are relevant and are based on account information received from your mobile service provider.

- **GSM access point name:** The service plan or access point name (APN).
- **User password:** The password for the User login of the mobile connection needed to access the mobile network. Depending on mobile service provider, this value may not be necessary.
- **SIM PIN code:** A password that allows an administrator user of the device to access information on the SIM card. The password is usually between four and eight digits. SIM PINs act like ATM PINs in that they require users to authenticate themselves as the true owner of the card before information is released. Depending on mobile service provider, this value may not be necessary.
- **User login:** The username of the mobile connection needed to access the mobile network. Depending on mobile service provider, this value may not be necessary.

SureLink settings

Digi SureLink™ is an optional feature that monitors the integrity of an established network connection. Several settings and tests can be configured to perform a selected test to examine the functional integrity of the network connection, and take action to recover the connection in the event that it is lost.

Currently SureLink is supported for cellular communications only.

The **SureLink** settings can be configured to perform a selected test to examine the functional integrity of the network connection, and take action to recover the connection in the event that it is lost.

- **SureLink enable:** Enables or disables the SureLink feature and the specified link integrity monitoring tests. The default is off (disabled).
- **Test interval:** The interval, in seconds, at which the selected test is initiated (repeated). A new test will be started every N seconds while the mobile connection is established. This value must be between 10 and 65535. The default is 240. This setting is used by Ping, TCP Connection, and DNS Lookup tests only, not iDigi Connection.

If the configured interval is less time than it takes a test to complete, the next test will not be initiated until the previous (current) test has completed.

- **Test only if link is idle:** Whether the test repeat interval (above) is to be used as an idle period interval. That is, initiate the selected link integrity test only after no data has been received for the specified interval of time. This changes the behavior of the test in that the test interval varies according to the presence of other data received from the mobile connection. This setting is used by Ping, TCP Connection, and DNS Lookup tests only, not iDigi Connection.

Although using this idle option may result in less data being exchanged over the mobile connection, it also prevents the link integrity tests from running as often to verify the true bi-directional state of that connection.

- **Number of consecutive failures to cause recovery action:** Specifies that after the configured number of consecutive link integrity test failures, the mobile connection should be disconnected and reestablished. This value must be between 1 and 255. The default is 3. When the mobile connection is reestablished, the “consecutive failures” counter is reset to zero.

If the mobile connection is disconnected for any reason (including not as a result of a link integrity test failure), the consecutive failures count is reset to zero when the mobile connection is reestablished.

- **Host List:** Two hostnames may be configured for this test. Hostnames can be specified in the form of domain names or IP addresses. If the first hostname fails to get a reply, the same test is attempted for the second hostname. If no reply is received for either hostname, the test fails. The primary and secondary DNS names should be fully qualified domain names. Note that the reverse lookup of an IP address is possible, but that is usually unlikely to succeed in returning a name. Still, such a reverse lookup can be used to demonstrate the integrity of the mobile connection.
 - **Primary Test Hostname:** The first hostname to look up.
 - **Secondary Test Hostname:** The second hostname to look up (if the first hostname fails).
- **TCP test port number:** The TCP port number to connect to on the remote host. The default is 80.
- **Test type:** There are several tests available:
 - Ping Test
 - TCP Connection Test
 - DNS Lookup Test
 - iDigi Connection Test

For descriptions of these tests, see page 50.
- **Link failure action:** The action to be performed when a link failure is detected:
 - **Reset modem:** Reset the cellular modem in the ConnectPort X2e ZB device.
 - **Reconnect interface:** Reconnect the cellular interface.

XBee Networks page

Clicking the **XBee Networks** menu within the iDigi Manager Pro tab opens the **XBee Networks** page. This page allows you to manage all the XBee Nodes in your inventory.

| Extended Address | Gateway Device ID | Module Type | Product Type | Node Type |
|-------------------------|-------------------|---------------|--------------|-----------|
| 00:13:A2:00:40:47:4C:85 | 001D09FF-FF31E4D6 | Unspecified | | 0x0 |
| 00:13:A2:00:40:5C:82:D3 | 001D09FF-FF31E4D6 | | | |
| 00:13:A2:00:40:6B:A5:66 | 001D09FF-FF31E4D6 | | | |
| 00:13:A2:00:40:0A:29:2A | 00409DFF-FF316347 | XBee ZB | X2 Gateway | 0x30003 |
| 00:13:A2:00:40:3E:26:1F | 00409DFF-FF316347 | XBee ZB | Wall Router | 0x30008 |
| 00:13:A2:00:40:48:59:BD | 00409DFF-FF316347 | XBee ZB | Smart Plug | 0x3000f |
| 00:13:A2:00:40:0A:12:DF | 00409DFF-FF340015 | | | |
| 00:13:A2:00:40:0A:12:D5 | 00409DFF-FF377323 | XBee ZB | X4 Gateway | 0x30002 |
| 00:13:A2:00:40:2C:17:46 | 00409DFF-FF37734F | XBee ZB | Unspecified | 0x30000 |
| 00:13:A2:00:40:60:47:35 | 00409DFF-FF37734F | XBee ZB | X2 Gateway | 0x30003 |
| 00:13:A2:00:40:3E:17:CB | 00409DFF-FF379C89 | XBee ZNet 2.5 | X2 Gateway | 0x20003 |

The *iDigi User's Guide* provides describes the settings and operations that can be performed from the XBee Networks pages and menus.

XBee RF module settings

The configuration information for an XBee node is displayed by opening its **Properties** page. To do this, either double-click on the node in the XBee Networks page, or right-click the node and select **Properties** or click the **Properties** toolbar button. The **Basic Settings** control basic operation of the XBee module in an XBee network. **Advanced radio settings** control behavior of the XBee module at a more detailed level. The **Summary** view provides an overview of current XBee RF module operational and state information.

If you select multiple devices, multiple **Properties** pages will be open corresponding to each device that was selected.

The screenshot shows the iDigi Developer Cloud interface. The top navigation bar includes the iDigi logo, 'Developer Cloud', and links for 'WELCOME', 'iDIGI MANAGER PRO', and 'WEB SERVICE'. Below this is a secondary navigation bar with tabs for 'Devices', 'XBee Networks', 'Data Services', 'Operations', and 'Sc'. The 'XBee Networks' tab is active, and a specific node with ID '00:13:A2:00:40:6B:94:71' is selected. The 'Basic' settings tab is chosen from a sidebar menu. The main content area displays the following settings:

| Basic | |
|-------------------------|------------------------------------|
| Node identifier: | <input type="text"/> |
| Node discovery timeout: | 60 <input type="text"/> x 100 msec |
| Scan channels: | 0x7fff <input type="text"/> |
| Scan duration: | 3 <input type="text"/> exponent |
| Transmit power level: | 4 <input type="text"/> |
| Node join time: | 0 <input type="text"/> sec |
| Broadcast radius: | 0 <input type="text"/> |

SMS settings

There are three groups of SMS settings and tasks in the iDigi Manager Pro interface from the right-click menu for the ConnectPort X2e ZB Cellular models:

- **Properties > Advanced Configuration > Cellular SMS**
- **Properties > Advanced Configuration > iDigi SMS**
- **SMS > SMS commands / Configure**

Properties > Advanced Configuration > Cellular SMS

Enabled: This setting enables or disables all SMS features on this Digi device. When this option is enabled, the remaining SMS options may be configured. This option is disabled (off) by default.

Properties > Advanced Configuration > iDigi SMS

These settings configure the iDigi device to be managed by iDigi via Short Message Service (SMS) messages.

- **State:** Enables or disables iDigi SMS support.
- **Restrict Sender to only iDigi Server Phone Number:** Only process inbound messages for iDigi from the number specified in the Phone Number setting. Messages from other phone numbers will be passed on to other SMS Services on the device.
 - **iDigi Server Phone Number:** The phone number or short code of the iDigi platform. For more information about the iDigi SMS Phone Number and Service ID fields, contact your Digi sales Representative, or use the iDigi Provision command. The default value for the phone number is **32075**.
- **iDigi Server Service Identifier:** The Service Identifier (prefix) of iDigi. This field is an optional setting and is used in cases where there is a shared short code in use, and an identifier (prefix) is required to redirect a message to a specific service under that short code. The default value is **idgp**.

SMS > SMS commands / Configure

Right-clicking the device and selecting SMS from the menu displays a set of SMS commands and an option to configure settings. Of the commands displayed in the list, the only ones currently supported are:

Request Connect

SMS > Request Connect sends an SMS message from iDigi to the iDigi device, calling it back to establish an EDP connection with the iDigi cloud server.

Reboot

SMS > Reboot sends an iDigi SMS message to the device to reboot itself.

Configure

SMS > Configure registers the phone number of your cellular device, allowing iDigi to send messages to it. For details on these settings, see the *iDigi User's Guide* topic "Configure the Device's Phone Number."

Administration/maintenance

CHAPTER 4

This chapter describes the administrative and maintenance tasks that need be performed for the ConnectPort X2e ZB periodically. It covers common administrative tasks and how to perform them through iDigi Manager Pro and the web interface.

Common administrative tasks

For the ConnectPort X2e ZB, common administrative tasks include:

- Firmware updates
- File management
- Rebooting the device

Firmware updates

There are two types of firmware updates for the ConnectPort X2e ZB:

- Firmware updates for the gateway operating system
- Firmware updates for the for the XBee RF module on the gateway and nodes

Gateway operating system firmware updates

Gateway operating system firmware updates for the ConnectPort X2e ZB can be downloaded from the Digi Support site. They can then be loaded through the web interface or iDigi Device Manager Pro.

The gateway operating system can only be upgraded, not downgraded, through the web interface or iDigi Manager Pro. The firmware image contains a certificate that is verified before an upgrade can be accepted by the gateway.

XBee RF module firmware updates

Updating the firmware for XBee RF modules involves two firmware update scenarios:

- Update firmware for the XBee module on the gateway
- Update firmware on XBee modules on nodes elsewhere in the network. This type of update is known as an *over-the-air (OTA) firmware update*.

Download firmware update files from Digi

There is only one firmware file for the XBee RF module in ConnectPort X2e ZB products. It is named **XBP24-S2C_40XX.ebl**, where **XX** is the firmware version.

This firmware is located on the Digi Support site at:

Support->XBee/XBee-PRO ZB SMT (S2C)Modules->Firmware Updates

From this location, you will download the **.zip** file; the **.ebl** file is included in the **.zip** file.

Then, you can use the **Firmware Update** function from the web interface or iDigi Manager Pro to update the firmware.

File management

A file management feature is provided to manage custom applications, their associated data files, and other files. It is also possible to push firmware update files to the device filesystem, and to pull log files from the device filesystem. The device filesystem is described on page 94.

Reboot device

The device can be rebooted as needed from the web interface or iDigi Manager Pro.

Administration from the Web interface

.....

Firmware Update

The **Firmware Update** page updates the gateway operating system firmware. (Firmware updates for the XBee RF module on the gateway or nodes are done on the **XBee Firmware Update** page.)

- **Volume Information:** Displays the current directory and free space remaining.
- **Firmware Information:** Displays the current firmware version running on the device, and its state: Running, Updating, Recent update failed.
- **Upload to Current Directory:** Uploads the firmware file to the current directory. Use the **Browse** button to choose the file on your PC that is the firmware update image.
- Click **Update Firmware** to pull the file from the PC into the device, then attempt a firmware update with the selected image.

XBee Firmware Update

The **XBee Firmware Update** page updates the firmware for the XBee RF module on the gateway.

- **Volume Information:** Displays the current directory and free space remaining.
- **Firmware Information:** Displays the current firmware version running on the device, and its state.
- **Upload to Current Directory:** Uploads the firmware file to the current directory. Use the **Browse** button to choose the file on your PC that is the firmware update image. Then use the **Upload** file button to upload the XBee firmware file to the **/userfs/WEB/mesh** directory in ConnectPort X2e ZB filesystem.
- Select the appropriate firmware file from the **File List**, and then click the **Update XBee Firmware** button to attempt a firmware update with the selected image.

XBee Status

The **XBee Status** page displays status information for the XBee RF module on the gateway. The parameters displayed vary based on the capabilities supported by XBee RF module; common parameters include the PAN ID, firmware and hardware versions, and the device type identifier. See the *XBee/XBee-PRO ZB SMT RF Modules Product Manual* for parameter descriptions.

Mobile Status

The Mobile Status page items are specific to a cellular modem or service provider account. These vary in the information reported from modem to modem and also differ between CDMA and GSM services. Whether a value is displayed depends on the modem type and connection state; if there is no value for a status field, it is not displayed. This information can be useful for troubleshooting and technical support. Following are example Mobile Status pages for ConnectPort X2e ZB GSM and CDMA models. Descriptions of the status fields follow.

| Mobile Status | |
|--------------------------|---------------------------|
| Current Status | |
| Device Type: | GSM |
| Manufacturer: | Telit |
| Model: | HE910-NAD |
| Revision: | 12.00.323 |
| Serial number: | 353836050003037 |
| Phone number: | 19522589762 |
| SIM IMSI: | 310410469747242 |
| SIM ICCID: | 89014104254697472424 |
| SIM PIN status: | READY |
| Signal strength: | -93 dBm |
| Signal level: | 2 of 3 bars |
| Signal quality: | 0.0 dB |
| Registration status: | Registered (Home Network) |
| Cell ID: | 57477BD |
| Location area code: | 7EFF |
| Mobile country code: | 310 |
| Mobile network code: | 410 |
| Operator name: | AT&T |
| Profile: | 0 |
| Connection state: | Connected |
| Connection duration: | 00:00:10 |
| IP address: | 166.201.91.103 |
| Peer address: | 166.201.91.103 |
| DNS primary address: | 209.183.54.151 |
| DNS secondary address: | 209.183.54.151 |
| Receive idle time: | 0 |
| Transmit idle time: | 0 |
| Connections: | 1 |
| Connection errors: | 0 |
| Carrier loss: | 0 |
| LCP echo failed: | 0 |
| Idle timeout: | 0 |
| User disconnect: | 0 |
| Monitoring errors: | 0 |
| Device resets: | 0 |
| Received bytes: | 180 |
| Transmitted bytes: | 288 |
| Total received bytes: | 180 |
| Total transmitted bytes: | 288 |

| Mobile Status | |
|--------------------------|---------------------------|
| Current Status | |
| Device Type: | CDMA |
| Manufacturer: | Telit |
| Model: | DE910-DUAL |
| Revision: | 15.00.021 |
| Serial number: | 270113182611735208 |
| MEID: | A10000328310A8 |
| PRL version: | 52992 |
| Provisioning status: | Provisioned |
| Phone number: | 9523039880 |
| Signal strength: | -91 dBm |
| Signal level: | 1 of 3 bars |
| Signal quality: | -16.0 dB |
| Registration status: | Registered (Home Network) |
| System ID: | 26 |
| Network ID: | 1 |
| Service: | EVDO Rev A |
| Channel: | 630 |
| Profile: | 0 |
| Connection state: | Connected |
| Connection duration: | 00:30:02 |
| Disconnect reason: | Carrier loss |
| IP address: | 75.239.36.13 |
| Peer address: | 66.174.194.224 |
| DNS primary address: | 69.78.235.35 |
| DNS secondary address: | 69.78.96.14 |
| Receive idle time: | 6 |
| Transmit idle time: | 6 |
| Connections: | 9 |
| Connection errors: | 6 |
| Carrier loss: | 2 |
| LCP echo failed: | 0 |
| Idle timeout: | 0 |
| User disconnect: | 0 |
| Monitoring errors: | 0 |
| Device resets: | 3 |
| Received bytes: | 9228 |
| Transmitted bytes: | 10446 |
| Total received bytes: | 9282 |
| Total transmitted bytes: | 11688 |

| Status field | Cellular modem type | Description |
|----------------|---------------------|--|
| Device type | Both | The type of cellular modem. For CDMA devices, the value for this field is CDMA . For GSM devices, the value for this field is GSM . |
| Manufacturer | Both | Manufacturer of the cellular modem. |
| Model | Both | Manufacturer's model number for the cellular modem. |
| Revision | Both | Manufacturer's version number for the software running on the cellular modem. |
| Serial number | Both | Manufacturer's serial number for the cellular modem. |
| Phone number | Both | The phone number stored on the SIM (for GSM) or cellular modem (for CDMA). The SIM may not have a number stored, or it may not be correct. |
| SIM IMSI | GSM | The International Mobile Subscriber Identity (IMSI) for the SIM card. This value can be considered account number for the mobile subscriber. |
| SIM ICCID | GSM | The Integrated Circuit Card Identifier (ICCID) for the SIM card. This value can be considered as the serial number of the SIM card itself. |
| SIM PIN status | GSM | Indicates whether a PIN needs to be entered to unlock the SIM card. There are many possible status values; some common ones are: <ul style="list-style-type: none"> ■ READY: SIM is ready. PIN has been entered or no PIN is needed. ■ SIM PIN: PIN is required to unlock the SIM. It can be entered on the Mobile Configuration page. ■ SIM PUK, SIM PIN2, SIM PUK2, and similar codes: SIM is locked and cannot be unlocked by the ConnectPort X2e ZB Cellular device. It must be placed in another device or phone to be unlocked. ■ Error: SIM not inserted or other SIM problem |
| SIM slot index | GSM | Displayed for products that support multiple SIMs only. Indicates which SIM slot is currently in use by the device. 0 means the first slot, 1 means the second slot. |
| MEID | CDMA | Mobile equipment identifier (MEID), globally unique number identifying a physical piece of CDMA mobile station equipment. |
| PRL version | CDMA | Preferred Roaming List version number. Updates are done at the same time as provisioning. |

| Status field | Cellular modem type | Description |
|---------------------|---------------------|---|
| Provisioning status | CDMA | <p>Specifies the status of the provisioning process for the cellular modem, in which it is configured with the required information used to access the cellular network.</p> <ul style="list-style-type: none"> ■ Not provisioned: Modem has not yet provisioned. Contact your mobile service provider to make sure your device is registered in your mobile account. ■ Provisioned: Modem is configured and ready to use ■ In progress: Modem is now being provisioned ■ Failed: Provisioning was unsuccessful. This may be caused by a poor signal, or the cellular modem not being activated with the carrier. |
| Signal strength | Both | <p>Received cellular signal strength indicator (RSSI). A measure of the signal level of the network.</p> <p>Different RSSI levels are used GSM vs. CDMA to determine the number of bars.</p> <p>For GSM: -108 or more is 1 bar, -93 is 2, -77 is 3</p> <p>For CDMA: -105 or more is 1 bar, -90 is 2, -75 is 3</p> |
| Signal level | Both | <p>An indicator of the received cellular signal, in bars.</p> <ul style="list-style-type: none"> ■ 0: No signal ■ 1: Poor signal ■ 2: Adequate signal ■ 3: Good signal |
| Signal quality | Both | <p>An indicator of the quality of the received cellular signal, measured in dB. This value is also known as Ec/Io.</p> |
| Registration status | Both | <p>The status of the cellular modem's connection to a cellular network.</p> <ul style="list-style-type: none"> ■ Not registered ■ Registered (Home network) ■ Searching for Network ■ Not Registered (Access Denied) ■ Not Available (Reason not Known) ■ Registered (Roaming) |
| Cell ID | GSM | <p>Identifier of the cellular base station with which the cellular modem is registered.</p> |
| System ID | CDMA | <p>The system identification number of the cellular network with which the cellular modem is registered.</p> |

| Status field | Cellular modem type | Description |
|--|---------------------|--|
| Network ID | CDMA | The network identification number of the cellular network with which the cellular modem is registered. |
| Location area code | GSM | Identifier of the location of a group of cellular base stations with which the cellular modem is registered, in hexadecimal format. |
| Mobile country code Mobile network code | GSM | These codes are used to uniquely identify a mobile phone operator/ carrier with which the cellular modem is registered. |
| Operator name | GSM | The name of the mobile operator with which the modem is registered. This corresponds to the mobile country and network codes. |
| Band | GSM 2G service only | <p>The radio frequency band being used by the modem. For GSM, the band can be one of the following:</p> <ul style="list-style-type: none"> ■ GSM 850 ■ GSM 900 ■ DCS 1800 ■ PCS 1900 <p>Future modems may have different values.</p> |
| Service | CDMA | <p>The type of data service provided by the cellular network. For CDMA, the data service is one of the following:</p> <ul style="list-style-type: none"> ■ None ■ 1xRTT ■ EVDO Rev 0 ■ EVDO Rev A <p>Future cellular modems may have other values.</p> |
| Channel | Both | Radio channel being used by the cellular modem. |
| Profile | Both | The current set of mobile configuration settings used to configure the cellular modem. ConnectPort X2e ZB Cellular products always use profile 0. |

| Status field | Cellular modem type | Description |
|---------------------|---------------------|---|
| Connection state | Both | <p>The operating state of the cellular modem:</p> <ul style="list-style-type: none"> ■ Initializing: Modem is being reset and configured ■ Registering: Modem is searching for a network ■ Delay before connecting: Modem is delaying after an unsuccessful connection (Verizon only) ■ Connecting: Mobile data connection is being established ■ Connected: Mobile data connection is active ■ Disconnecting: Mobile data connection is ending ■ Disconnected: Mobile data connection has ended. See Disconnect reason for the cause. ■ Disabled: Mobile data connection is not enabled by configuration settings (not on X2e yet) ■ Provisioning: Modem is being provisioned with the mobile carrier (CDMA only) ■ PRL update: Preferred roaming list is being updated (CDMA, not on X2e yet) ■ Operator scan: Modem is searching for available mobile operators (GSM, not on X2e yet) ■ No device found: Modem is not available or is malfunctioning |
| Connection duration | Both | <p>Amount of time the current mobile data connection has been active. The format is <i>N</i> days <i>HH:MM:SS</i>.</p> |
| Connection error | Both | <p>Displayed after a connection error occurs only. Indicates the reason the previous connection attempt failed:</p> <ul style="list-style-type: none"> ■ SIM PIN required: The SIM PIN must be entered on the Mobile Configuration page. ■ SIM PIN incorrect: The SIM PIN entered does not match the actual one for the SIM. ■ SIM not ready: No SIM inserted or other SIM problem. ■ Not registered: Modem did not register with a cellular network. ■ Dial failed: Error starting data connection. ■ Authentication failed: Incorrect login or password entered on the Mobile Configuration page. ■ Connection timeout: Connection did not complete. ■ Device reset error: Modem could not be reset. ■ Device open error: Modem is malfunctioning. ■ Device config error: Modem could not be configured. ■ PPP error: Internal system error |

| Status field | Cellular modem type | Description |
|-----------------------|---------------------|---|
| Disconnect reason | Both | <p>Displayed after a previous connection was ended. Indicates the reason the previous connection was ended:</p> <ul style="list-style-type: none"> ■ User requested: Initiated by user action. ■ Network disconnect: Initiated by cellular network or carrier. ■ Carrier loss: Poor signal or disconnected by network. ■ Connection timer: Connection did not complete. ■ Receive idle timer: No data received for configured receive idle time. ■ Device monitoring error: Error while monitoring the modem status. May indicate a malfunctioning modem. |
| IP address | Both | Internet protocol address of the mobile data interface. The device may be contacted at this IP address if permitted by the carrier. |
| Peer address | Both | Internet protocol address of the mobile data server. This IP address is typically provided as background information, and not normally used to communicate with the device. |
| DNS primary address | Both | IP address of the primary Domain Name System (DNS) server assigned by the mobile carrier. This server resolves domain names to IP addresses. |
| DNS secondary address | Both | IP address of the backup DNS server assigned by the mobile carrier. |
| Receive idle time | Both | The amount of time since data was last received by the cellular modem. |
| Transmit idle time | Both | The amount of time since data was last transmitted by the cellular modem. |
| Connections | Both | The number of mobile data connection attempts since the ConnectPort X2e ZB Cellular device was started. |
| Connection errors | Both | The number of unsuccessful mobile data connection attempts since the ConnectPort X2e ZB Cellular device was started. |
| Carrier loss | Both | The number of times the connection was lost because of poor signal or being disconnected by the network. |
| LCP echo failed | Both | The number of Link Control Protocol (LCP) echo requests that have been sent after a “quiet” interval to test the cellular link and/or keep it alive that have failed. Not used by ConnectPort X2e ZB Cellular products. |

| Status field | Cellular modem type | Description |
|-------------------------|---------------------|---|
| Idle timeout | Both | The number of connection resets because the idle timeout was reached/ exceeded for transmitted and received data. |
| User disconnect | Both | The number of disconnects of the cellular connection performed by device users. This type of user disconnect is currently only done by a user when provisioning the cellular modem, |
| Monitoring errors | Both | Number of errors encountered while monitoring the cellular modem status. May indicate a malfunctioning modem. |
| Device resets | Both | Number of cellular modem resets caused by errors, failed connection attempts, or user requests. |
| Received bytes | Both | Number of bytes received by the cellular modem during the current data session. |
| Transmitted bytes | Both | Number of bytes transmitted by the cellular modem during the current data session. |
| Total received bytes | Both | Total number of bytes received by the modem since the ConnectPort X2e ZB Cellular device was started. |
| Total transmitted bytes | Both | Total number of bytes transmitted by the modem since the ConnectPort X2e ZB Cellular device was started. |

File Management

The **File Management** page loads files onto the ConnectPort X2e ZB and displays current information about loaded files. For a description of the filesystem layout, see page 94.

- **Volume Information:** Displays the current directory for loading files and free space remaining.
Note: Digi recommends using no more than 20 MB for custom applications, as the ConnectPort X2e ZB requires a portion of the same space to be capable of managing persistent system logs and firmware updates.
- **Upload to Current Directory:** Uploads files to the current directory. Use the **Browse** button to find a file on your PC to be uploaded to the ConnectPort X2e ZB. Click **Update file** to begin the file upload process.
- **File List:** A listing of the “current directory” (as noted in the **Volume Information** area) on the device.
 - **Open:** Opens a directory after it is selected in the file list. The “current directory” will change and the list will be updated.
 - **Make Directory:** Creates a new, empty directory in the “current directory.”
 - **Save As:** Downloads a regular file from the filesystem to your local PC.
 - **Remove:** Deletes files or, for directories, empty directories only.
- **Refresh button:** Reloads all the information on the page.

System Log

The **System Message Log File Browser** is a diagnostic tool that allows viewing entries in a system log file. The default log file that can be viewed from this browser is **eventlog.txt**. This file is the primary message log for informational notices.

System Message Log File Browser

Log File

Message Filters

☒ mobile
 ☒ system

Messages

```

Jan 25 21:42:39: System: Start
Jan 25 21:42:51: Mobile: sms: Task started for user 0
Jan 25 21:42:51: Mobile: Select profile 0, SIM none
Jan 25 21:42:51: Mobile: sms: Cellular SMS initialization complete.
Jan 25 21:42:51: Mobile: sms: Cellular SMS is enabled.
Jan 25 21:42:59: Mobile: Connection state: Initializing
Jan 25 21:43:00: Mobile: Connection state: Registering
Jan 25 21:43:00: Mobile: SIM PIN status: READY
Jan 25 21:43:00: Mobile: sms: Cellular SMS is supported for the discovered module.
Jan 25 21:43:01: Mobile: Registration status: Not Registered
Jan 25 21:43:01: Mobile: RSSI: -120 dBm
Jan 25 21:43:22: Mobile: Registration status: Searching for Network
Jan 25 21:43:29: Mobile: Registration status: Registered (Home Network)
Jan 25 21:43:29: Mobile: RSSI: -89 dBm
Jan 25 21:43:32: Mobile: Registered (Home Network), waited 31 seconds
Jan 25 21:43:32: Mobile: Connection state: Connecting
Jan 25 21:43:39: Mobile: Connection state: Connected
          
```

There are other system log file that are available for debugging specific parts of the system. Note that these log files have a fixed size and roll over when the maximum size is reached. When the file rolls over, a single secondary file is created with the extension **.0**. For example, when **xbee.log** rolls over, the older data will be stored in **xbee.log.0**. When both files have reached their maximum size, the older file will be overwritten. Also note that many of the log files are stored in persistent memory (flash) and will contain data from multiple boots. The only exception is **xbee.log**, which is stored in a RAM disk.

Logging is always enabled and is not user-configurable. When the Digi device operates in an unexpected manner, the log entries can be sent to Digi for analysis by Technical Support and Engineers. The event log cannot be turned off, so that Digi receives an accurate view of all aspects of the operation of the device.

Available log files and contents

The following log files are available:

| Log file | Contents |
|---------------------------------|--|
| eventlog.txt/ eventlog.txt.0 | High-level system messages. |
| python.log/ python.log.0 | Captures any output of Python programs that were started with the Python auto-start feature. |
| xbee.log/ xbee.log.0 | A non-persistent log file that records all XBee traffic. |
| digi.log/ digi.log.0 | For internal use only. This file may be requested by the Digi technical support group. |
| sef.log/sef.log.0 | For internal use only. |

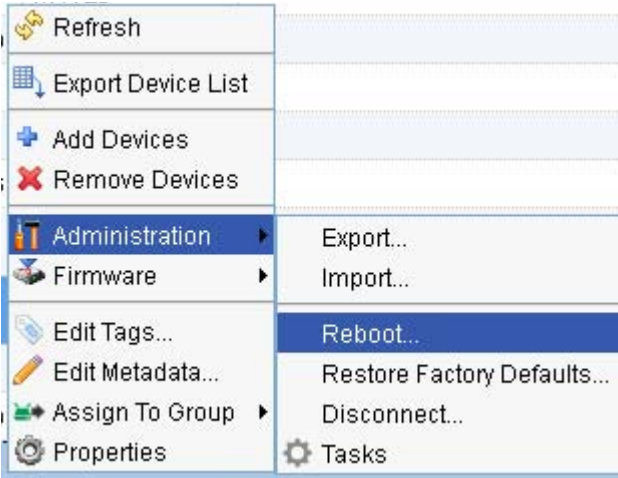
The **Message Filters** allow Digi Technical Support working with customers on troubleshooting issues to more quickly hone in on areas of interest in the log file as needed.

Reboot

To reboot the ConnectPort X2e ZB, click the **Reboot** menu option. Wait approximately 1 minute for the reboot to complete.

Administration from iDigi Manager Pro

In iDigi Manager Pro, administration tasks are organized in the right-click menu for the ConnectPort X2e ZB, under **Administration** and **Firmware**. The File Management task is launched from a link in the device **Properties** page.



Restore Factory Defaults

Administration > Restore Factory Defaults restores the factory default configuration to the selected device or devices. The only supported choice is to reset all the configuration settings.

Reboot

Administration > Reboot reboots the selected device or devices.

Disconnect

Administration > Disconnect disconnects the device from iDigi. If the device is configured to automatically reconnect to iDigi, it will re-establish the connection to iDigi after its reconnection timeout period has expired.

Firmware

The Firmware options perform several types of firmware updates.

Update Firmware: Gateway operating system firmware updates

Firmware > Update Firmware updates the gateway operating system firmware from a specified firmware file. In the dialog, select a firmware file to upload to the selected device or devices. Once the firmware file is downloaded to the device, the device will be rebooted automatically.

Update Gateway XBee Radio Firmware

Firmware > Update Gateway XBee Radio Firmware updates the firmware on the XBee RF module on the ConnectPort X2e ZB. In the dialog, select an XBee radio firmware file to upload to the selected device or devices. Once the XBee radio firmware file is downloaded to the device, the device will be rebooted automatically.

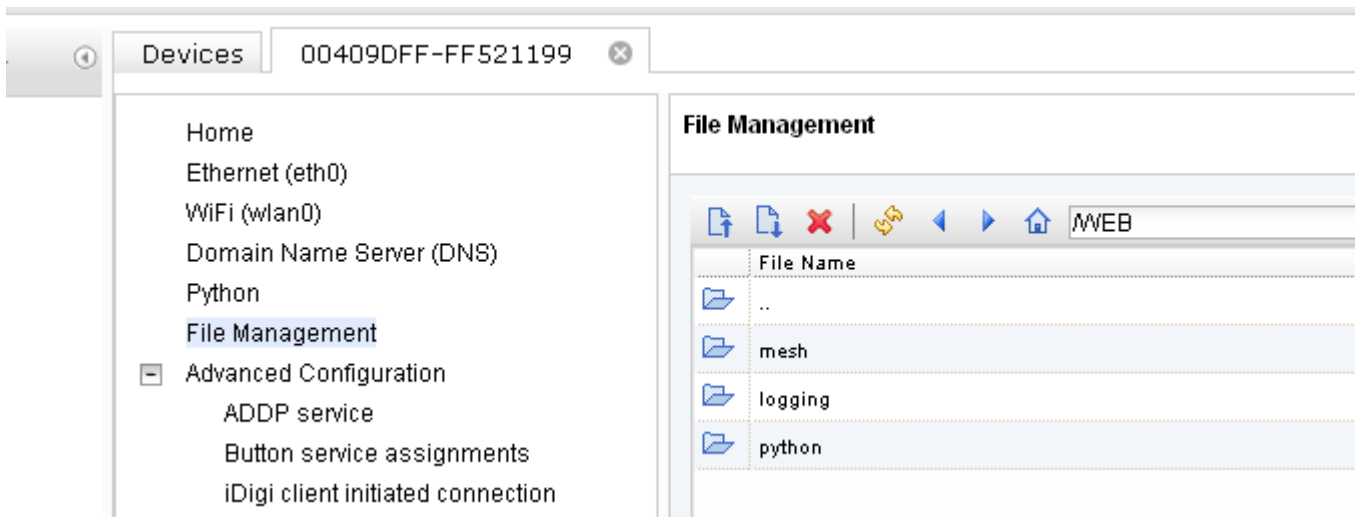
Update XBee Node Firmware

Firmware > Update XBee Node Firmware updates the XBee firmware for the selected remote node. Once the XBee radio firmware file is downloaded to the remote node, the remote node will be rebooted automatically.










File Management

The File Management task is launched from the **Properties** page for ConnectPort X2e ZB, by clicking **File Management**. This page loads files, such as custom application files, onto the ConnectPort X2e ZB and displays current information about loaded files. This page can also be used to download system log files from the ConnectPort X2e ZB to view for troubleshooting or other purposes. These log files are in the **/WEB/logging** folder. For a description of the ConnectPort filesystem layout, see page 94.

Note: Digi recommends using no more than 20 MB for custom applications, as the ConnectPort X2e ZB requires a portion of the same space to be capable of managing persistent system logs and firmware updates.



The File Management toolbar provides quick access to file management tasks.

| Button/ Field | Name | Description |
|---|-------------------------------|---|
|  | Upload file | Opens a dialog for uploading files to the current folder (directory). |
|  | Download file | Downloads the selected file to a PC. You can choose to open the downloaded file with a specified tool or save it. |
|  | Delete | Deletes the selected items. |
|  | Refresh | Refreshes the list of folders and files displayed. |
|  | Back | Move to the previous folder in folder history. |
|  | Forward | Move to the next folder in folder history. |
|  | Home | Returns to the root folder. |
|  | Current or destination folder | An editable field that displays the current folder, and which can be used to enter a different destination directory. |
|  | Go | Goes to the directory specified in Current or destination folder field. |

System log

There is no browser interface for system logs in the iDigi interface. Instead, to view logs, use the File Management page to navigate to the directory **WEB/logging** in the ConnectPort X2e ZB filesystem, and access the log files **digi.log**, **xbee.log**, and **python.log**, and others using the **Download file button**. These files are read-only. For more information on these log files, see page 75.

System information

The **System Information** pages display general system information and system statistics. This information is typically used by technical support to troubleshoot problems. For example, here is the information for the mobile (cellular) interface.

The screenshot shows the iDigi Manager Pro interface. At the top, there are tabs for 'Devices', 'XBee Networks', 'Alarms', 'Operations', and 'Schedules'. The 'Devices' tab is active, and a specific device with ID '00409DFF-FF6A664E' is selected. On the left, a tree view shows the device's configuration structure, with 'Mobile information' highlighted under 'System Information'. The main panel displays the 'Mobile information' details for the selected device.

| Mobile information | |
|----------------------------|---------------------------|
| Mobile Version: | 2.0 |
| Device Type: | CDMA |
| Manufacturer: | Telit |
| Model: | DE910-DUAL |
| Revision: | 15.00.021 |
| Serial number: | 270113182611734900 |
| MEID: | A1000032B30F74 |
| PRL version: | 52992 |
| state:mobile_stats/1/prov: | Provisioned |
| Phone number: | 9526079461 |
| Signal strength: | -88 dBm |
| Signal level: | 2 of 3 bars |
| Signal quality: | -15.0 dB |
| Registration status: | Registered (Home Network) |
| System ID: | 26 |
| Network ID: | 1 |
| Service: | 1xRTT |
| Channel: | 548 |
| Profile: | 0 |
| Connection state: | Connected |
| Connection duration: | 00:16:15 |
| IP address: | 75.221.54.114 |
| Peer address: | 66.174.193.64 |
| DNS primary address: | 198.224.162.119 |
| DNS secondary address: | 198.224.163.135 |

Programming

C H A P T E R 5

The ConnectPort X2e ZB offers a variety of interfaces that produce and/or consume data. Developing software programs for ConnectPort X2e ZB products allows Digi customers to provide custom logic to control the flow information to and from these interfaces. This chapter introduces the Digi programming tools and resources available to you, and, using annotated example programs, introduces programming elements and operations available for the ConnectPort X2e ZB.

Programming resources

Several tools and resources are available for developing software programs for the ConnectPort X2e ZB.

Python

Python is a dynamic, object-oriented language for developing software applications, from simple programs to complex embedded applications. The ConnectPort X2e ZB runs the standard Python 2.7.1 distribution. This Python distribution has a more complete library set than the versions supported in predecessor gateway products, and integrates well with standard Python.

Digi ESP for Python

Digi ESP for Python is an Integrated Development Environment (IDE) that allows for easy development of applications in the Python programming language to be loaded, run, tested, and debugged on the device. This development environment includes a Getting Started Guide that guides you in creating your first simple application for your ConnectPort X2e ZB, plus extensive documentation, tutorials, and code samples to help you get started developing custom applications for your product. Digi ESP for Python is built on Eclipse, an open, extensible IDE, and the Python Development Environment (Pydev) plug-in.

Unlike proprietary embedded development platforms, the integration of the universal Python programming language allows for a truly open standard for complete control of connections to devices, the manipulation of data, and event-based actions.

For example, applications can be created to:

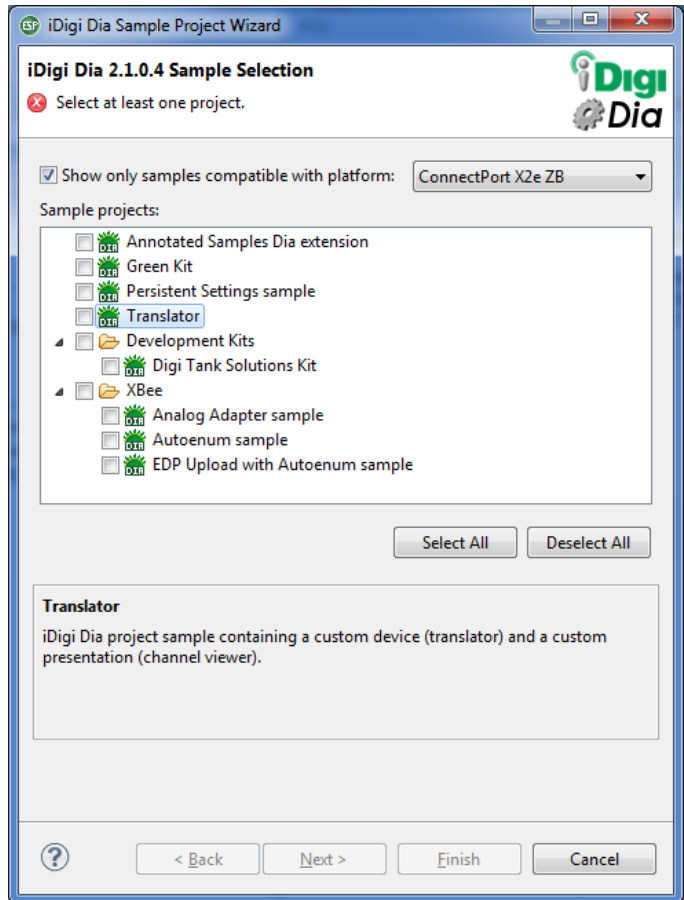
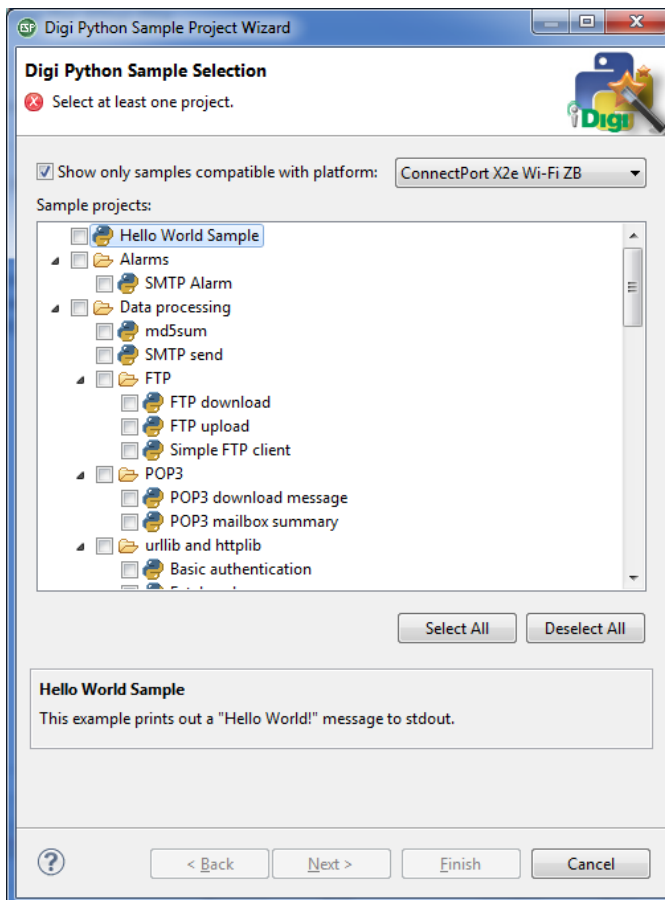
- Aggregate data on the gateway throughout the day, then upload to iDigi once a day.
- Develop a driver for a custom protocol to talk to device connected to the gateway, such as devices in an XBee network.
- Translate data, for example, from raw serial into an XML format that can be consumed by other systems, such as iDigi.

The *Getting Started Guide* shows how to download and install Digi ESP for Python, and how to launch the Getting Started tutorial to build your first application.

Program samples in Digi ESP

Digi ESP for Python provides samples to use as a base for programming the ConnectPort X2e ZB, including specific examples for exercising specific interfaces available on the ConnectPort X2e ZB. These program samples can be accessed from the Python or iDigi Dia samples wizard.

- 1 Go to **File > New > Digi Python Application Sample Project** or **File > New > iDigi Dia Sample Project**. The samples wizard, Python or iDigi Dia, will be opened.
- 2 Check the option **Show only samples compatible with platform**. In the combo box, select **ConnectPort X2e ZB** or **ConnectPort X2e Wi-Fi ZB**.
- 3 The samples in the list will be filtered, and only the ones compatible with the selected sample will be displayed.; for example:



iDigi Dia software

The Digi ESP development environment includes iDigi Device Integration Application (iDigi Dia) software. This software simplifies connecting devices (sensors, PLCs, etc.) to communication gateways. It includes a comprehensive library of plug-ins that work out-of-the-box with common device types and can be extended to include new devices. Its unique architecture allows the user to add most devices in under a day. iDigi Dia is a tested architecture that provides the core functions of remote device data acquisition, control, and presentation between devices and information platforms. It collects data from any device that can communicate with a Digi gateway, and is supported over any gateway physical interface. iDigi Dia presents this data to upstream applications in fully customizable formats, significantly reducing a customer's time to market. Written in the Python[®] programming language for use on Digi devices, iDigi Dia can be executed on a PC for prototyping purposes when a suitable Python interpreter is installed. iDigi Dia is targeted for applications that need to gather samples of data from a set of devices, such as ZigBee[®] sensors, wired industrial equipment, GPS devices, etc. It is an integral component of the iDigi platform, which customers can deploy with iDigi Dia software to build flexible, robust solutions with unprecedented speed.

Programming calls through Server Command Interface (SCI) and Remote Command Interface (RCI)

The iDigi Web Services Server Command Interface (SCI) and the Remote Command Interface (RCI) can be used as an alternative means of getting settings and state data from the device. See the SCI (Server Command Interface) chapter of the *iDigi Web Services Programming Guide* and the *Remote Command Interface (RCI) Specification*.

Digi Developer Community Wiki

The Digi Developer Community Wiki provides references for developing solutions using Digi's communications portfolio, software and services, including Python, iDigi Platform, iDigi Dia, and more. The Wiki includes how-to's, example code, and M2M information to speed application development. Digi encourages an active developer community and welcomes your contributions.

http://www.digi.com/wiki/developer/index.php/Main_Page

ConnectPort X2e ZB Wiki

Within the Digi Developer Community Wiki are pages for ConnectPort X2e ZB-specific programming information, beginning here:

http://www.digi.com/wiki/developer/index.php/ConnectPort_X2e

Digi Python Programmer's Guide

The *Digi Python Programmer's Guide* introduces the Python programming language by showing how to create and run a simple Python program. It reviews Python modules, particularly those with Digi-specific behavior, and describes how to load and run Python programs onto Digi devices, and run sample Python programs. This guide is on the Digi Python Wiki; in the **Start Here** section, click the link titled **Digi Python Programmer's Guide**

http://www.digi.com/wiki/developer/index.php/Digi_Python_Programmer%27s_Guide

Python Support Forum on digi.com

Find answers to common questions and exchange ideas and examples with other members of the Digi Python development community at:

<http://www.digi.com/support/forum/listforums?category=25>

Digi-specific Python modules for programming

Several Digi-provided built-in modules apply to functionality in the ConnectPort X2e ZB. To learn more about these built-in modules, go to:

http://www.digi.com/wiki/developer/index.php/ConnectPort_X2e

From that page, navigate to the information pages on these modules:

- **digihw**: Provides an interface to local hardware.
- **idigimsg**: This is an internal module with functions used by iDigi Dia and Smart Energy Framework.
- **rci**: Provides a mechanism for processing arbitrary RCI request strings, as well as a means to set up callbacks to allow Python scripts to respond to remote requests made via specialized RCI commands.
- **uptime**: Allows access to the Linux **gettime** function for various clocks.
- **watchdog**: A safeguard that an application can use for critical operations, in which, if the application threads do not service their watchdog within the promised interval, the entire system reboots.
- **xbee**: A collection of utility methods for programming the XBee RF module on the ConnectPort X2e ZB device. It also includes the Python XBee socket interface support.
- **digisms**: For low-level, generic SMS message handling.
- **idigisms**: For communicating using iDigi's SMS protocol to/from iDigi.

Sample programs

.....

These simple annotated samples introduce several programmable features for the ConnectPort X2e ZB, including button handling, LED control, watchdog, RCI callback, and XBee functions.

Button handling

The following sample program demonstrates functions for handling the button on the ConnectPort X2e ZB.

```
import select

fd=open('/var/run/reset_button')                (1)
p=select.poll()
p.register(fd, select.POLLPRI)                  (2)
fd.read()                                       (3)

while True:
    p.poll()                                    (4)
    fd.seek(0)                                  (5)
    val = int(fd.read()[0])                     (6)

    if val:                                     (7)
        print "Button pressed!"
    else:
        print "Button released!"
```

Program notes

- 1 The reset button is exposed as a Linux file. It can be read to determine the state of the button, and it is possible to block waiting for the button state to change.
- 2 To block waiting for the button, the standard Python **select** module is used. This line, and the line above, demonstrate how to create a polling object that can wait for button state changes.
- 3 Read the current value of the button, but forget it. This is done to “clear” the button and prepare to wait for its state changes.
- 4 Rather than reading the button in a loop, the system waits for button state changes using the polling object created earlier.
- 5 To read the current value, we first “rewind” to the beginning of the “file.”
- 6 **fd.read()** gets pending data from the button file. **fd.read()[0]** returns just the first character of that data. **int(fd.read()[0])** makes explicit the fact that we expect the character we read to be an integer.
- 7 If we read a non-zero value, the button is currently pressed.

LED control

Controlling the LEDs on the ConnectPort X2e ZB is handled through the **user_led_set** function. This sample program controls the Network LED.

Note that if native features are still assigned to the LED, those behaviors will mix with the behaviors in the sample program.

```
import digihw (1)
import time

while True:
    digihw.user_led_set(True,1) (2)
    time.sleep(1.0)
    digihw.user_led_set(False,1) (3)

    digihw.user_led_set(True, 2) (4)
    time.sleep(1.0)
    digihw.user_led_set(False,2) (5)
```

Program notes

- 1 The **digihw** module includes the **user_led_set** function needed by the program. **user_led_set** has two parameters: *value* and *led*. The user controlled LED is made to match the logic state of the “*value*” parameter. A value of “True” turns on the LED, and a value of “False” turns it off. The “*led*” parameter indicates which user LED to blink, with LED 1 being the default.
- 2 Turn on the “yellow” Network LED.
- 3 Turn off the “yellow” Network LED.
- 4 Turn on the “green” Network LED.
- 5 Turn off the “green” Network LED.

Watchdog

The watchdog feature, provided through the **watchdog** module, exists as a safeguard. If there are critical operations that “must” happen periodically, or else the system will be irretrievably broken, an application can request that a “watchdog” be established. If the application threads do not service their watchdog within the promised interval, the entire system reboots. These software watchdogs can have their intervals changed, if necessary, and can be deleted. Clearly, use of such a software watchdog exists as a measure of last resort. Appropriate error detection and handling with Python scripts is certainly recommended.

The following sample program demonstrates the watchdog feature.

```
import watchdog                                     (1)
import time

w=watchdog.Watchdog('test',20)                     (2)
for x in xrange(1,6):                               (3)
    print "Step ", x                                (4)
    time.sleep(10.0)                                 (5)
    w.heartbeat()                                    (6)
print "Step just before the end..."                (7)
time.sleep(60.0)                                     (8)
print "Step after the end."                          (9)
```

Program notes

- 1 The **watchdog** module includes the **Watchdog** class needed by the program.
- 2 Create a watchdog object named “test” that will expire in 20 seconds.
- 3 Loop five times (1-5).
- 4 Indicate our iteration...
- 5 ... sleeping less than the timeout on each iteration, but more time than the timeout in total.
- 6 Reset the watchdog timer to 20 seconds each iteration, allowing all of the loops to complete.
- 7 Indicate that small loops are complete.
- 8 Sleep for an interval much longer than the timeout.
- 9 This **print** statement should never be executed, as the system should have rebooted due to the watchdog timeout expiration.

RCI callback

An RCI callback involves two types of actions, demonstrated in the following programs:

- Making RCI requests from Python applications
- Extending RCI to allow iDigi to make requests of Python applications. This is known as an *RCI callback*.

Make an RCI request-example program

```
import rci (1)
```

```
request_string="" (2)
<rci_request version="1.1">
  <query_state>
    <interface_info name="eth0">
      <ip/>
    </interface_info>
  </query_state>
</rci_request>
""
```

```
print rci.process_request(request_string) (3)
```

Program notes

- 1 The **rci** module includes the **process_request** function needed by the program.
- 2 A string representing the RCI request is needed. The sample uses the Python multi-line string syntax to make it clearer that the XML represents a request for the current IP address of the Ethernet interface. Combining the lines into a single string on one line would work in the same way.
- 3 The RCI XML is submitted for parsing, and the resulting string is returned. In this sample, the result is simply printed.

Make an RCI request-example program

Following is a simple RCI callback example:

```
import rci (1)

def cb(req): (2)
    print "Received request: " + req (3)

r=rci.RciCallback() (4)
r.register_callback('test', cb) (5)

rci.process_request('<rci_request version="1.1"><do_command
    target="test"><customxml/></do_command></rci_request>') (6)
```

Program notes

- 1 The **rci** module includes the **RciCallback** class needed by the program.
- 2 Create a function to be called whenever a remote entity wishes to communicate with this script.
- 3 This simple function will simply demonstrate that it received a request that could be parsed and handled however the application saw fit.
- 4 Create a callback object.
- 5 Assign the target “**test**” to the new callback object. If a remote entity issues a “**do_command**” with the target “**test**”, the supplied callback function will be called.
- 6 This is simply an example that causes the callback to be called. This example could also have been a remote SCI query through iDigi.

XBee functions

For a description of the **xbee** module and program samples, see this Wiki page:

<http://www.digi.com/wiki/developer/index.php/Module:zigbee>

Sending and receiving SMS messages

For examples of using SMS send/receive in programs, see the ConnectPort X2e ZB program samples in Digi ESP for Python.

The ConnectPort X2e ZB filesystem

.....

The ConnectPort X2e ZB has a Linux-based filesystem. This section gives an overview of the key directories of the filesystem and common operations performed on directories and files.

Differences between Windows and Linux filesystems

If you are transitioning from a Windows-based filesystem to a Linux filesystem, the following article covers some of the key differences between Linux and Windows filesystems.

<http://freeos.com/articles/3102>

Important directories

The files on a Linux system are arranged in what is called a hierarchical directory structure. This means that they are organized in a tree-like pattern of directories (called folders in other systems), which may contain files and other directories. The first directory in the file system is called the **root** directory. The **root** directory contains files and subdirectories, which contain more files and subdirectories and so on and so on. One important difference between the legacy operating system and Unix-like operating systems such as Linux is that Linux does not employ the concept of drive letters. While drive letters split the file system into a series of different trees (one for each drive), Linux always has a single tree. Different storage devices may contain different branches of the tree, but there is always a single tree.

The frontslash / is used as a directory separator, instead of the backslash \ used in Windows and DOS.

The **/WEB/python/** directory is for user-specific files, such as custom Python applications. Subdirectories can be created in this area for the customer's applications. This area is read-write.

The **/WEB/logging** directory contains system log files, including **eventlog.txt**, **python.log**, **digi.log**, **xbee.log**, and **sef.log**. These files are read-only. For more information on these files, see "System Log" on page 75.

Access/browse the filesystem from device interfaces

There are three aspects or ways in which you will interact with the filesystem resident on the ConnectPort X2e ZB: through the web interface, and through the command line interface, and through iDigi.

Common operations for directories and files

The ConnectPort X2e ZB supports standard Linux shell file operations for managing directories and files. See the command shell reference document listed on page 95 for details on these operations.

The Linux command shell (command-line interface)

A *shell* is a program that takes commands from the keyboard and gives them to the operating system to perform. On the ConnectPort X2e ZB, a program called **ash** acts as the shell program. This shell can be useful in several instances, particularly in managing files, executing Python programs, and programming and executing commands the XBee RF module in the gateway.

Username and password for the Linux command shell

Access to the ConnectPort X2e ZB is at the user level

The username is **python**.

The password is **dbps**.

Connect and log on to the device

To connect and log on to the device through the command-line interface:

- 1 Open a command prompt or terminal window, such as one provided by PuTTY available for downloading from <http://www.putty.org/>.

- 2 From **Windows**, enter:

putty SSH

When prompted, enter the username: **python** and the password: **dbps**

OR

From **Linux**, enter:

```
$ ssh python@my_ip_address
```

Where *my_ip_address* is the IP address of the ConnectPort X2e ZB. When prompted, enter the password: **dbps**

Command shell reference documentation

For more information on the ash shell, see the following document. Note that the ash shell supported in the ConnectPort X2e ZB is similar, but not identical, to the ash shell described in this documentation.

<http://linux.die.net/man/1/ash>